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CANCER OF THE ŒSOPHAGUS FROM THE STANDPOINT OF INTRA-THORACIC SURGERY[1]

A REPORT OF FOUR RESECTIONS

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IN a previous article of mine, entitled, "Some Observations Regarding Thoracic Surgery on Human Beings," published in the Annals of Surgery, July, 1910, the first sentence reads thus: "In order to further the evolution of thoracic surgery, I think that operators in this field should consider it their duty to publish in full their personal experiences, favorable or unfavorable."

To-day, after an additional experience of two years, I am more firmly of that opinion than ever. Every worker in this field should be afforded the opportunity to learn from the experiences of his colleagues, be they ever so disappointing to those who had them.

Especially does this hold good with reference to the surgery of the œsophagus. Resection of the œsophagus for malignant stricture with ultimate recovery from the operation is still an unsolved problem. Not a single patient is so far known to have pulled through. Yet, technically, the work in all its phases is well feasible. It has been in the course of the immediate after-treatment that the accidents responsible for the fatal issue have invariably occurred.

The reasons for the failures that have thus far attended all our attempts seem to be principally the following:

1. *The general condition of the patients.* By the time they reach the surgeon it has become too much reduced.

2. *The spread of the disease.* The local growth has trespassed the border lines of the organ in which it started, involving the vital organs in its immediate neighborhood, the pneumogastric and sympathetic nerves, the aorta or lung.

3. *The magnitude of the operation.*

4. *The extreme thinness in man of the wall of the œsophagus.*

The ideal operation for cancer of the œsophagus is resection with establishment of an anastomosis between the oral portion of the œsophagus and the stomach at one and the same sitting. Unfortunately, this can be done only in cases of annular stricture of scirrhous character in the lower third of the œsophagus and at the cardia, in which the resection of but a short part of the tube is necessary. The stomach can then be brought up to the proximal stump of the œsophagus to be united by suture or button without undue traction on the place of anastomosis. However, a thoracic transposition of the stomach of three to four inches seems to be the limit that can ever be hoped for in the human being, and as in the majority of cases of œsophageal malignant disease the growth

[1] Read before the fifteenth annual meeting of the American Gastro-Enterological Association, Atlantic City, June 4, 1912.

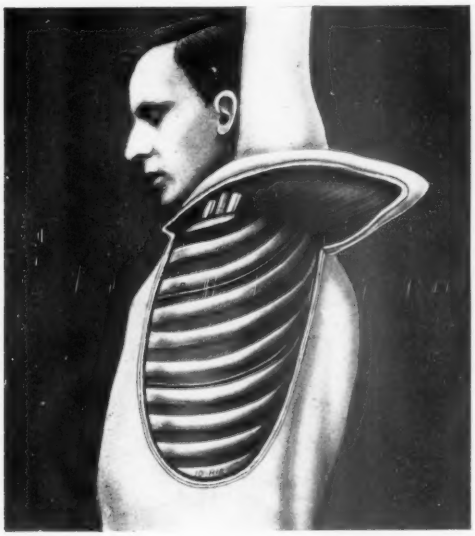

Fig. 1. Schede's incision raising a skin-muscle flap including scapula. With the arm pulled up perpendicularly, the scapula takes a position at right angle with the thorax. When the patient's head is in the differential pressure apparatus, the arm forms a right angle with the thoracic wall. Then by turning the arm inwardly 180° (or the forearm 360°) the scapula moves away from the chest and can be held well out of the way. During operation it is kept wrapped in aseptic gauze. A, incision in sixth; B, incision in third intercostal space.

The illustration shows chest wall unnecessarily far exposed upward for the purpose of œsophageal surgery. The belly of pectoralis major and latissimus dorsi muscles have to be divided for a short distance only and bundles of the serratus anticus major cut. The subclavian vessel and brachial nerve plexus do not come into view.

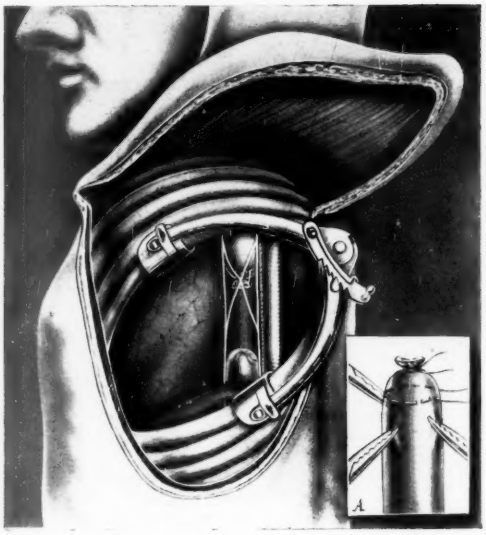

Fig. 2. The incision in sixth intercostal space; rib-spreader in place; to the left, lung and diaphragm visible; to the right, the descending aorta still covered by the continuation of the costal pleura; next to it. the œsophagus, divided; lower end inverted; the upper tied with silk. Pneumogastric nerves run on either side, with their anterior osculation. A, lower stump of the œsophagus ready for inversion, with the purse-string suture in place. The old method of pulling the tube apart with three clamps for the purpose of inverting stump has been improved upon by the method illustrated in Figs. 6 to 9 of this article.

is not annular and not localized, but involves a greater part of the canal, and as often three to four or even five inches must be cut out, a subsequent direct apposition and union is thereby rendered an unsafe, if not impossible, surgical procedure.

In order to reach these latter patients, too, a different, more complicated course, is to be followed, consisting in: Preliminary gastrostomy; excision of the growth within healthy tissue, irrespective of the number of inches to be sacrificed; double invagination of either stump, the upper one to be pulled from behind the aortic arch for this purpose; feeding through the gastric fistula for a reasonable length of time; then formation of a new extrathoracic subcutaneous œsophagus by plasty.

Without reconstruction of the œsophagus the patient can, of course, only chew and taste his food. He can swallow it, but the oral stump of the œsophagus is closed; consequently regurgitation will occur. What he can do without discomfort, is to return the salivated food from his mouth into some kind of fluid and then wash it down by funnel through the fistula, or use Trendelenburg's procedure and blow it through a rubber mouth-piece into the stomach. If, however, the patient desires to regain also the power of swallowing — and no doubt the majority of those who may in future recover from resection will — this will necessitate the formation of a new œsophagus; and this again will mean the addition of a series of operations, at least three in number, according to our present knowledge.

But, should the prospect of such seriatim operative procedure deter the surgeon? Cer-

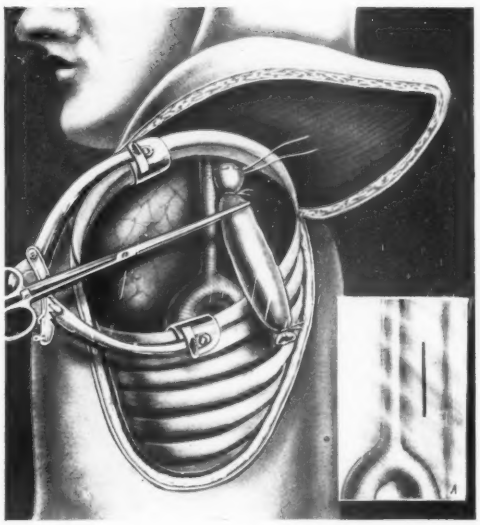

Fig. 3. Additional incision in third interspace; rib-spreader turned around, as scapula is in the way; œsophagus exposed by incision about one inch to the outside of the common carotid, which remains covered with pleura, as also does the aortic arch (see small picture A in right corner). The portion of the œsophagus harboring the tumor, pulled from behind the aortic arch, tied and clamped, ready to be divided with cautery, completing the resection. The first of the two superior purse-string sutures in place, for inversion of upper stump. (See Figs. 6 to 9).

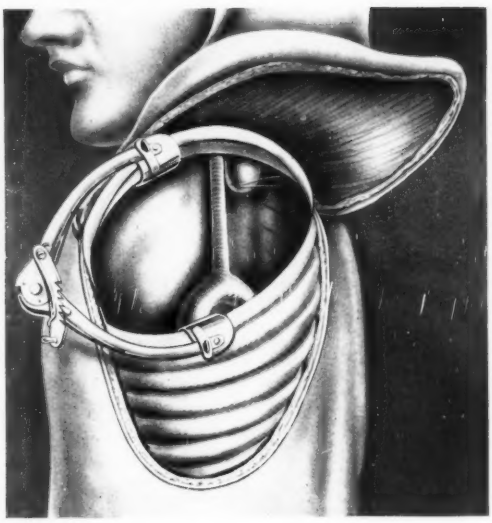

Fig. 4. Interior of the cavity as it appears after completed double inversion of upper œsophageal stump. Note below the latter the groove in which the œsophagus rested.

tainly not. He should bear in mind that cancer of the œsophagus is clinically the most benign type of malignant disease in the entire alimentary canal. He should remember, too, and make at least one member of the patient's family clearly understand it, that without such operating, the patient is absolutely lost, that gastrostomy is but a poor palliative measure, after which nothing but misery stares the patient in the face, and that the only hope, slender and as yet intangible though it be, is in immediate operation. Therefore, I say, we must go on; we must learn to overcome the difficulties that have so far marred our endeavors. We must first of all learn how to pull the patient through a resection of the œsophagus, as such. The reconstruction part is for the present a secondary consideration, although it is comforting to know that a well-working new œsophagus can be made, and that in various ways.

The first requisite for good and safe surgical work in the upper part of the chest, especially at the level of the aortic arch, is proper access to the operative field for both eyes and hands. To best obtain this, I think the scapula must be gotten out of the way by means of Schede's incision (Figs. 1–4).[1] With the bony chest-wall thus well exposed, any further incision that may appear necessary in any of the intercostal spaces may be added. Multiple intercostal incisions do not complicate the operation nor add to its seriousness.

Sauerbruch reaches the upper portion of the œsophagus from the right side. He turns a skin muscle flap outward toward the right, resects the first, second and third costal cartilage and part of rib, divides the clavicle at its inner third or turns the bone outward after a discission of the claviculo-sternal articulation, and then pulls the œsophagus forward from below the trachea. (Fig. 5.)

So far I have not tried this operation in man, but I have tested it in the dog. According to my present belief, the raising of the scapula with the help of Schede's incision is

[1] These four illustrations have appeared in author's article, mentioned above. Annals of Surgery July, 1910.

simpler, as only soft tissues, the serratus anticus major, pectoralis major and latissimus dorsi muscles, need partial division, the scapula being included in the skin muscle flap.

Sauerbruch's operation gives very good access to the upper portion of the œsophagus as long as the latter is freely movable. An impacted foreign body in the upper third of the œsophagus, for instance, and a localized, nonadherent tumor can surely be nicely reached and operated on. But as soon as adhesions exist, the work must become much more difficult. The aortic arch, and especially the space beneath it, is inaccessible from above, as the heart is in the way. Sauerbruch, therefore, excludes from radical operation all cases with adhesions around the œsophagus. I am inclined to draw the lines of indication for resection somewhat wider, believing that cases with adhesions around a malignant stricture in the upper portion of the œsophagus should not be ruled out so long as it is still possible to dissect off at least one pneumogastric nerve.

I wish to emphasize once more that, according to my belief, excision of infiltrating carcinoma of the upper two-thirds of the œsophagus, *involving several inches of the same*, can be done in no other way than by lifting the scapula and making more than one intercostal incision. This procedure gives the surgeon perfect control of the operative field; it enables him to follow the nervi vagi through the seventh or eighth intercostal incision from the cardia up to and beneath the aortic arch. The second incision in the third or fourth interspace will then give easy access to the upper portion of the œsophagus and permit the cocainization and continuation of the sharp dissection of the nerves, as far above the aortic arch as the case may require, always under the guidance of the operator's eye.

The necessity of pulling the œsophagus from behind the aortic arch (Figs. 3 and 4) adds visibly to the shock of the operation, if one or both pneumogastric nerves be involved and need direct handling. Severe disturbance of pulse and respiration are usually noticeable at this moment. It is as if we shook the system at the very root of life. For it is here where the branches of the vagi are given off to the heart and lungs, and the most intimate anastomoses exist with the complex sympathetic system.

Yet, it is rarely possible to leave the œsophagus in situ behind the aortic arch, as so often the greater part of its lower or middle portion is diseased, and proper surgical work cannot be done back of the aortic arch. We must therefore learn to reduce the shock, by cocainizing at least one of the pneumogastric nerves and by dissecting both nerves carefully *with the knife* under the guidance of the eye, also by operating slowly and deliberately at this critical juncture. Pulling and tearing of the nerves must be strictly avoided; it does irreparable harm.

That the method as such is possible, is proven by our positive results in dogs. Of the animals thus operated upon, two pulled through nicely and lived for weeks.

It has been my hard luck that, in the four patients with malignant œsophageal stricture in whom radical operation could be tried, the disease has been of the infiltrating type. I shall here give a brief history of the cases.

CASE 1.[1] F. L., male, 43 years old. Symptoms of increasing œsophageal obstruction for last six months; stricture located 12½ inches (32 cm.) behind teeth, or about 3 inches (8 cm.) above cardia. Radiograph shows stricture. Operation March 31, 1910, under positive pressure. Nitrous oxide plus oxygen anæsthesia (Dr. R. C. Coburn). Schede's incision with raising of scapula was done on left side, before differential pressure apparatus was brought into use. Then, with patient's head placed in positive cabinet, incision in sixth intercostal space. Tumor in lower end of œsophagus, about one inch (2¾ cm.) distant from cardia. Infiltration reaches upward to a place underneath aortic arch; stripping-off of pneumogastric nerves; division of œsophagus between two silk mass ligatures, with Paquelin cautery; double invagination of distal stump; additional incision in third intercostal space; upper part of œsophagus, one inch outside from common carotid, quickly reached and isolated with the finger. With left hand working from above and right introduced through lower incision, bluntly loosening the tube from below, the œsophagus, containing the tumor at its lower end, is gradually pulled from behind the aortic arch. The right pneumogastric nerve had to be divided in two places. At this time severe interference with pulse

[1] For details of this case see Annals of Surg., 1910, vol. 52, page 47.

and respiration which does not yield to any kind of stimulation; double invagination of upper stump; closure of wound; dressing. Ten minutes after completion of dressing patient expires. Cause of death, shock. Pathologic examination of tumor, epithelioma.

CASE 2. Male, 66 years of age; typical symptoms of œsophageal stricture for last three months; obstruction found 14 inches (35 cm.) from teeth. X-rays corroborated findings. Operation July 6, 1910; positive pressure cabinet.[1] Head of patient at once placed in apparatus. Lower half of Schede's incision. Thorax opened in eighth intercostal space. Infiltrating tumor, reaches down to a place just above cardia, envelops right pneumogastric nerve; left can be well separated. On basis of this finding, resection decided upon in spite of advanced age of patient, as latter desired radical operation, if possible. Upper end of tumor too far above diaphragm to consider resection with œsophago-gastrostomy a feasible operation. Cardia pulled into thoracic cavity. This is again well possible in consequence of its physiologic loose connection within the foramen œsophageum of the diaphragm. Division of œsophagus between two mass-silk ligatures; lower stump invaginated and buried in stomach by a number of interrupted silk sutures. Upper half of Schede's incision added; scapula turned up; second incision in fifth intercostal in order to reach region just below aortic arch to better advantage, as it has been planned to avoid, if possible, pulling lower two thirds of œsophagus from its bed. Resection of tumor. Invagination of upper stump fails twice. Therefore it becomes necessary to bring œsophagus in front of aortic arch, as in Case 1. This having been accomplished resection is repeated to gain shorter stump. Now invagination easy; two interrupted top sutures; closure of thorax and external wound. Throughout entire operation artificial respiration, or better said, slow, rhythmic changes of pressure had been made with the apparatus every fifteen minutes, for a short period of time. Intravenous infusion of saline plus adrenalin given during operation. At close of work, pulse satisfactory; slight cyanosis; returned to ward. On the following day, 7 A. M., condition satisfactory. Temperature 102; pulse 108, but rather weak; still slightly cyanotic; upper part of body raised; hypodermic and rectal stimulation. 2 P. M., pulse weak; cyanosis increased. Before patient could be returned to apparatus for positive pressure and artificial respiration, he suddenly died.

Wound inspection the same day: Large amount of serosanguinolent fluid in left pleural cavity, compressing lung; small amount in right; left lung collapsed; right, well aërated. Cause of death: effusion of fluid into pleural cavity, compressing lung. I am forced to the conclusion that, had the pleural cavity been drained, the result might have been different. Certainly in this case where the tumor did not reach up to the aortic arch, and adhesions with the nervi vagi further upward were absent, the loosening and traction of œsophagus from behind aortic arch and out of the network of its surrounding nerves, did not produce the symptoms of vagus irritation.

Fig. 5. Sauerbruch's incision to reach the upper portion of the œsophagus from the right side. (From Sauerbruch-Schumacher, Technik der Thorax-Chirurgie, page 96.)

CASE 3. J. C., male, 57 years; increasing difficulty in swallowing for a number of months. Primary gastrostomy (Dr. F. Torek); loss rather than gain in weight in spite of forced feeding. Obstruction 11 inches (28 cm.) from teeth. X-ray picture positive. Operation November 9, 1911.[2] Negative chamber; anæsthol-oxygen anæsthesia (Dr. C. F. A. Eggers). Incision in seventh intercostal space; about one inch below aortic arch a hard infiltration is palpable, fully two inches in length; finger can be passed under aortic arch and around tumor; excision decided on. Schede's incision added, anterior and posterior part of the same meet the first wound at right angle. Second entrance to chest through fourth intercostal space for primary investigation of conditions above

[1] The first two cases of œsophageal resection were done in a special room at the German Hospital where provision had been made for thoracic work with the positive pressure cabinet; the negative chamber had not yet been transferred to the hospital. Regarding apparatus in resection of the œsophagus, I share Sauerbruch's view and prefer the negative chamber, as it taxes the patient's heart the least.

[2] I am much indebted to Dr. Torek for allowing me to operate on this patient, who was under his care in his division.

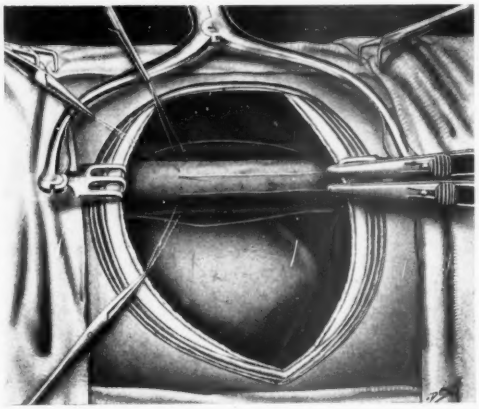

Fig. 6. Œsophagus exposed, with pneumogastric nerves pushed off, and purse-string suture placed, piercing œsophageal wall at four places; the three loops are caught with one kind of clamps, the two ends each with a different style.

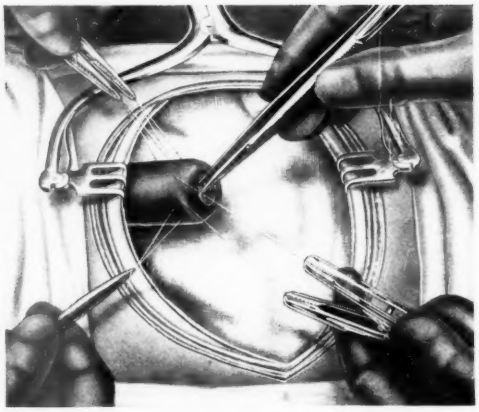

Fig. 7. After protection of operating field, œsophagus has been divided with cautery or scissors. If with the latter, the stump is touched up with carbolic acid and alcohol. While the operator holds the three loops tight, the assistant invaginates stump with his right hand, at the same time he continuously pulls with his left on the two ends of the thread until the clamps fixating the loops reach the wall of the œsophagus, when they are removed.

aortic arch. They are found satisfactory. Return to first incision. Double ligation and division of œsophagus and burying of lower stump, as usual; œsophagus mobilized as in first and second cases. In order to bring it in front of aortic arch, force has unfortunately to be employed to loosen the right pneumogastric nerve, which is tightly adherent just underneath arch. This part of the operation also had to be hurried, much against the plan, on account of the fact that the mass-silk ligature had slipped off the stump. Narcotizer, who was in the positive pressure cabinet with the patient's head and could not see operative field, reports at this juncture sudden change in pulse and respiration. Operation interrupted; rhythmic pressure with apparatus immediately improves heart action nicely; it is kept on for a while; work then continued; resection of tumor; double invagination of proximal stump. Immediate drainage of left pleural cavity in complementary space through ninth intercostal incision, also, externally, in upper anterior angle of Schede's incision. Wound carefully closed by layer sutures; projecting piece of drainage tubes secured with safety pin; skin protected with piece of split gauze; rubber dam cover; voluminous dressing. Patient transferred to after-treatment bed and brought to positive cabinet, in which he remains under differential pressure;[1] 9 P. M., intravenous saline plus adrenalin, 500 cc.; 5:30 A. M., sudden exitus. Nine hours later, wound inspection: No retention of fluid in thoracic cavity; plenty of secretion in dressing. Cause of exitus: vagus death. Pathologic diagnosis of tumor: Squamous cell-epithelioma.

[1] See Annals of Surgery, 1912, vol. 56, page 104.

CASE 4. R. F. B., 51 years old. Five months ago first signs of interference with swallowing solid food; two months ago first regurgitation; last eight weeks only fluids passed; of late these are regurgitated in spite of regular sounding. Pain in upper right chest with each deglutition; lost sixty-five pounds in weight in last six months. Sound and X-ray demonstrate presence of two strictures 11 and 14 inches (28 and 36 cm.) behind teeth. Radiograph shows beginning of obstruction corresponding to body of ninth dorsal vertebra. March 4, 1912, Witzel's gastrostomy, followed by forced feeding; food well chewed. March 25, resection of œsophagus; negative chamber; in positive cabinet with narcotizer (Dr. Eggers) and patient's head, is Prof. Yandell Henderson of Yale University, who most courteously directed the anæsthesia (gas-oxygen), especially with reference to the use of a seven per cent mixture of oxygen and carbon dioxide in tanks. Short exploratory incision in eighth intercostal space. Tumor involves lower third of œsophagus, inclusive of cardia; firmly adherent to aorta and lung; loosened bluntly; pneumogastric nerves pushed off low down; gradually fingers get tumor freed without much hæmorrhage; right pleural cavity also opened; unavoidable. Tumor involves 3½ to 4 inches of the œsophagus and reaches up to a point about 1½ inches below aortic arch. Diaphragm peeled off bluntly from cardia; peritoneal cavity entered; cardia pulled into thorax for 1½ inches; freed, so that a clamp can be placed to shut off cavity of stomach; temporary tamponade. Now Schede's incision, meeting posterior angle of first wound with curve, anterior portion at right angle; scapula raised; sur-

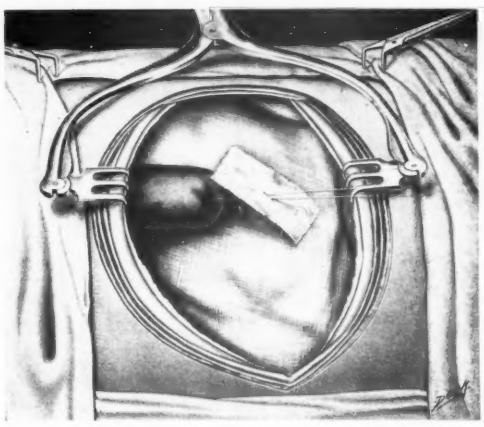

Fig. 8. Purse-string suture tied and ends passed through the stab in centre of fascia graft.

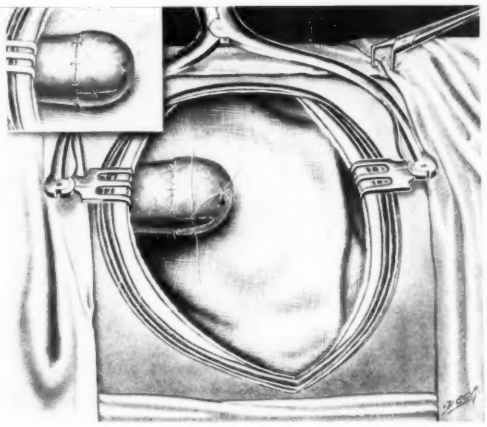

Fig. 9. Fascia graft has been stitched in place; one suture, not yet closed, has caught the long side of the graft bent upon itself, fixating on its way the œsophageal wall; a second suture, not yet tied, passes through stab of the graft. The purse-string suture which closes the œsophagus still projects through the small wound in the centre of the graft.

Small picture in upper left-hand corner shows all sutures tied, the graft surrounding the stump like the tip of a finger cot.

rounded with aseptic gauze; second incision in fourth intercostal. (At this time intravenous saline of 1,000 cc.). Work continued. Incision of posterior costal pleura about one inch outside of common carotid; œsophagus again promptly found and loosened with finger from above downward to some extent beneath aortic arch; temporary tamponade. Continuation of operation at cardia; strong silk ligature at lower end of tumor; division with cautery; interrupted silk suture at stomach; second inverting suture on top. Under guidance of eye, pneumogastrics gently stripped off and dissected upward as far as possible. The right one, thoroughly surrounded by tumor, divided with knife at about middle of same. Then, re-entering upper intercostal incision with left hand; œsophagus loosened from its bed with difficulty; it is firmly adherent posteriorly. After tumor is brought in front of aortic arch, right pneumogastric nerve also divided above. Marked interference with pulse and respiration. Resection of tumor after double ligation and division with cautery; double invagination of proximal stump; drainage of pleural cavity through tenth intercostal space; one long cigarette drain, with central tube, in bed of œsophagus; two split rubber tubes on either side. Typical closure of wound, during which second intravenous of 500 cc. is given; dressing; patient placed in positive pressure apparatus; oxygen with carbon dioxide continued at intervals; hypodermic stimulation; at 11:15 P. M., sudden giving-out of pulse. Cause: vagus death. Wound inspection not permitted. Pathological diagnosis: Epithelioma, the two strictures found before operation corresponding to the upper and lower end of the infiltrating tumor.

Prof. Henderson's observations in this case proved again the remarkable stimulation of respiration and incidentally of pulse by the use of oxygen plus carbon dioxide.

COMMENT

Reflecting on this case, it might have been better had I tried to reach the œsophagus also *right above* the upper end of the tumor viz., close to the lower border of the aortic arch through a third intercostal incision in the fifth or sixth interspace. There the nerves should have been at once exposed with the knife and primarily blocked, and if found not to be detachable from the tumor, cut, had I determined to finish the operation at all. Surely the experience gathered in these intrathoracic operations with reference to the serious effect of traumatic vagus irritation on pulse and respiration coincides with Reich's conclusions.[1] The latter are based on a thorough study and analysis of cases from Bruns' clinic, and of the respective literature, as well as on a series of convincing animal experiments, in which the pneumogastrics had been exposed and irritated at the neck. It is to be hoped that in operations for œsophageal carcinoma the primary blocking of the nervus vagus above

[1] A. Reich, Injuries of the Nervus Vagus and its Consequences. Bruns' Beitr. zur klin. Chir., 1908, vol. 56, p. 684.

and below the tumor as proposed by Reich — at least of the one nerve principally involved — in combination with the most careful and gentle dissection of the nerves, repeatedly referred to above, will teach us how to avoid in the future these most serious, sudden alterations of pulse and respiration, observed in three of the four cases cited.[1]

It requires gradual personal training to get over the extreme and bitter disappointment one feels on seeing a patient pass away, sooner or later, after a difficult operation that had taxed to the utmost the physical and mental endurance of surgeons, assistants and nurses for a number of hours. Some of the men who entered into this new field of operative surgery with great enthusiasm have given it up in despair. Others have resolved to temporarily confine their work to the lower third of the œsophagus.

Personally, I am convinced that real progress in this difficult chapter cannot be made by thus limiting our efforts. We should continue to attack the malignant growth in whichever portion of the œsophagus we find it. However, I have learned from the four above reported cases, that an operation of such magnitude as the one here required is too much to be undertaken in one sitting in reduced patients. I have, therefore, for the present decided in cases of cancer of the upper two thirds of the œsophagus not to abandon the operation, but to do it in two stages.[2] My plan is as follows:

I. Incision in eighth left intercostal space; thorough palpation and, if possible, inspection of tumor in order to determine its operability. If resection appears feasible, isolation of the tube below tumor; division; double invagination of the lower, also of the upper stump, if this appears feasible. [Experimental work with reference to the best treatment of the lower end of the upper stump, if but a single invagination be feasible, is in progress.] Closure of intercostal wound. Drainage of the thorax through special intercostal incision with differential pressure—after-treatment.

II. Seven to ten days later; Schede's incision; entrance through sixth and third intercostal spaces. Careful dissection of pneumogastric nerves, one of which to be cocainized, and divided with the knife, if need be;[3] gentle loosening of œsophagus in its bed at aortic arch and bringing it in front of latter. Resection of the tumor; double invagination of the upper stump; drainage through special incision; closure of intercostal wound, and (again) immediate after-treatment under differential pressure with the help of the positive pressure apparatus. If both pleural cavities were opened in the course of the work, conditions that surrounded the patient during the operations hould be continued; viz., he should *not* be transported to another positive pressure cabinet, but remain with his head within the one forming a part of the negative chamber.

To reverse the plan, and attend to the proximal stump first, would necessitate a primary Schede incision. Further observations will have to prove whether this would be an advantage. It certainly would clear up the principal question as to whether both pneumogastric nerves are involved at the aortic arch, in which event, according to our present knowledge, operation is contra-indicated. To find this out at the second stage of the operation would, naturally, be most disappointing. Division of the œsophagus at its lower end and invagination of both stumps done at the first stage of the operation, according to the plan laid out above, would under such conditions mean an artificial, premature total œsophageal obstruction, which, however, would have come in the greater number of cases without operation sooner or later anyway, and would not, therefore, greatly add to the precariousness of the patient's condition.

On April 11, 1912, I had an opportunity of trying this plan for the first time in a patient 56 years of age, with malignant obstruction just behind the aortic arch. The

[1] George W. Crile J. Am. M. Ass., July 13, 1912.

[2] It is self-understood that the surgeon will individualize and try to do the work in *one* sitting if the patient's general condition seems to warrant it.

[3] Further investigations are required in order to guide the surgeon, whether *both* pneumogastric nerves can be cocainized or even divided at and above the aortic arch.

lung was distended as usual by increased negative pressure just before sealing the external thoracic wound by suture. I did not establish drainage of the thoracic cavity at the end of the first part of the operation, expecting to do this after the second stage. This proved a mistake. The patient died quite suddenly, twenty-eight hours after the first operation, having been in satisfactory condition shortly before the end. Post-mortem demonstrated serosanguinolent fluid *plus air* in the pleural cavity. I have no doubt that this air was aspirated from the œsophagus in consequence of the negative pressure existing within the thorax during inspiration, the purse-string suture having punctured the thin œsophagus at one or more places; in other words, death was due to pressure pneumothorax, this most deadly of all accidents we meet with after intrathoracic operations, plus acute infection of the pleural cavity, the serosanguinolent effusion proving the presence of this latter condition. To avoid such occurrences, we should (1) try to close the proximal stump air-tight; (2) make it a rule, after any kind of operation upon the human œsophagus, to drain the pleural cavity.[1]

Ad. I. In view of the extreme thinness of the wall of the human œsophagus, penetration of some sutures through the wall of the same will be unavoidable, lest the sutures tear out or cut through, even when gently pulled upon. The method I am trying out experimentally at the present time in dogs, in order to guard against leakage, is the immediate free transplantation of a piece of fascia (F. König) sufficiently large to entirely envelop the stump like a finger cot. We[2] have taken a rectangular piece of fascia from the region of the upper rectus muscle, holding and handling the stump after a single invagination with the two threads of the silk purse-string suture left long; the two corners of the short sides of the graft are stitched to the anterior and posterior aspect, respectively, of the œsophagus; the long sides are brought into apposition by two additional interrupted sutures which catch the œsophageal wall on their way (Fig. 9).

By stabbing the graft in the centre and pulling the purse-string threads through this hole (Fig. 8) the technical work of the fascia transplantation may be rendered easier and the posterior wall of the œsophagus made more accessible; after cutting the purse-string suture short, one overlapping stitch closes the stab-wound (Fig. 9). It goes without saying that such grafting, if successful, makes the stump water- as well as air-tight — an absolute necessity, if the tumor to be removed at the second sitting should not be thoroughly obstructing, as the patient could not help swallowing saliva, even though he were warned against it. A specimen derived from a dog, 36 hours after operation, has proved the absolutely firm attachment of the fascial graft. There was not the slightest leakage of fluid on strong pressure with a large hand syringe.

One word about the technique which has seemed best to us in forming the stump: Invagination in the depth of the thorax is not always easy. Formerly we grasped the œsophageal wall with three long forceps some distance from the point of division and held them apart. (Cf. Fig. 2, small picture in right lower corner). But the forceps tear out easily. Lately we have, therefore, adopted the following plan:

Purse-string silk suture penetrates œsophageal wall at four different places; the three loops thus formed are caught with same kind of forceps, the two ends with a different type (Fig. 6). When ready for invagination, the operator holds the three loops on the stretch while the assistant gradually pulls on the two ends with one hand, while invaginating the stump with the other (Fig. 7). When the three forceps of same kind are in touch with the œsophageal wall, they are removed. Then the purse-string suture is pulled taut and tied (Fig. 8).

Ad. II. In view of the fact that an *immediate* air- and water-tight condition of the proximal stump can most probably not be accomplished by the free fascia transplanta-

[1] Cf. Annals of Surgery, 1912, l. c.

[2] As formerly, I had the effective and reliable help of Dr. Martin Rehling, adjunct attending surgeon at the German Hospital, in the experimental work, which I have been permitted to continue at the Rockefeller Institute. He also assisted in the thoracic operations at the hospital.

tion in the given case,[1] added drainage of the thoracic cavity will act as a second safety against the occurrence of pressure pneumothorax, as well as against infection.

There can be no doubt that the methodical addition of drainage in all cases of intrathoracic œsophageal operations will improve the prospect of the patient's recovery.

Many of the at present seemingly insurmountable obstacles to a successful issue of œsophageal resection would become greatly diminished if surgeons could operate on these patients *at an early stage*, a point which need not remain a "pium desideratum" forever. The diagnosis of beginning œsophageal carcinoma is easier than that of cancer of the pylorus; the gradual onset of difficulty in deglutition, without the history of a previous burn, is an important factor in establishing the diagnosis. The diseased area can be located with the excellent sound of Schreiber's,[2] even at an early stage; after which it can be found and seen with the œsophagoscope and a piece be removed for microscopical examination.

If it were but once demonstrated in any part of the world that recovery after œsophageal resection is possible, it would be the starting point of faith on the part of laity and profession in the possibilities of thoracic surgery with reference also to this important chapter. The awakening of this confidence is what we need.

It is wrong, therefore, for surgeons to lose courage, just because this problem has not been solved as speedily as could have been wished. A great deal has already been learned; much, though, still remains to be learned. With the combined efforts of surgeons all over the world, with the improved methods of general anæsthesia, with the possibility of immediate drainage, we have every right to expect that we shall succeed in solving the problem.

Let us therefore continue our efforts to try and solve it. Should we fail, after all, we have at least the satisfaction to have found and learned to understand the many pitfalls, the avoidance of which will enable those who follow us to reach the goal, and to let then also this most deplorable class of patients enjoy the blessings of modern surgery.

CIRCULAR RESECTION AND SUTURE OF THE AXILLARY ARTERY FOR TRANSVERSE LACERATION BY FRACTURE-DISLOCATION OF ANATOMICAL NECK OF THE HUMERUS.

By J. J. BUCHANAN, M. D., Pittsburgh, Pennsylvania
Surgeon to Mercy Hospital; Fellow American Surgical Association

FRACTURE through the anatomical neck of the humerus, with dislocation of the head, appears to be an injury of sufficient rarity as yet to justify report of isolated cases. In 1908 the writer was able to find but thirty-eight cases verified by autopsy, X-ray or operation,[3] and the literature since that time has not shown any great number of new cases.

Laceration of the axillary artery as a complication of this injury is not mentioned in the history of any of these thirty-eight cases, nor does it appear to have occurred in any of the cases reported subsequently. This bone lesion was not the causative factor in any of the cases of circular suture cited below nor in any of the reported cases of lateral suture of this artery.

The case, therefore, herein reported appears to be unique.

History of case. Mr. A. E. S., aged 58, on the evening of November 1, 1911, was about to board a

[1] Experience must show whether it is necessary that a fascia graft be put on the oral stump after *double* invagination. The latter most likely prevents leakage of larger masses in the act of swallowing. Our positive results on dogs point in this direction. The immediate postoperative drainage of the thoracic cavity will then guard against infection from possible leakage through penetrating stitch holes of the purse-string suture. For the sake of saving time double invagination must always be aimed at in both acts of œsophageal resection. Where in the presence of adverse local conditions, only *single* invagination is possible, fascia grafting will be advisable.

[2] T. Schreiber, Berl. klin. Woch., 1911, No. 25.

[3] Annals of Surgery, 1908, xlvii, 659.

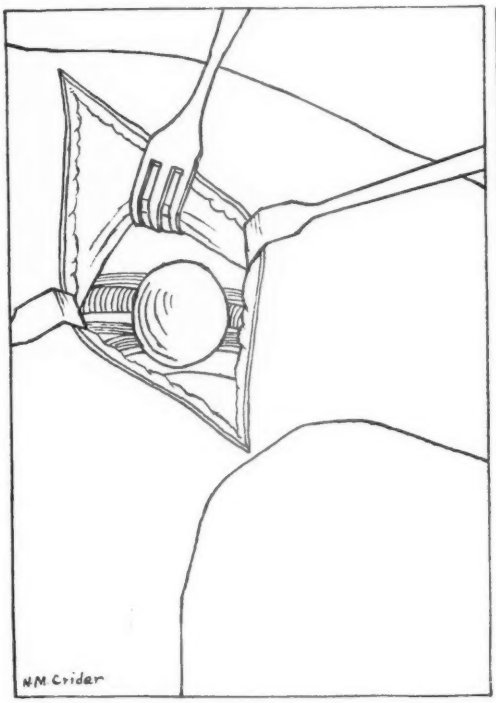

Fig. 1.

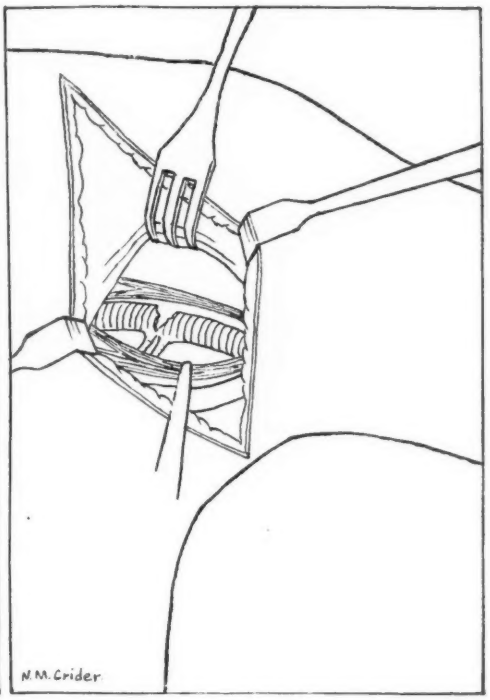

Fig. 2.

train as it was moving from the station. A young man stepped in front of him and Mr. S., seeing that he could not get aboard, pushed himself from the train and fell, striking his left shoulder on the platform. Whether his arm was dislocated by the jerk of the train or in what position it was when he fell, he was unable to say.

He was brought at once to Columbia Hospital where he was examined, under ether, by the writer's assistant, Dr. John W. Dixon, who made a diagnosis of fracture-dislocation of the shoulder and had an X-ray plate made by Dr. Russell H. Boggs, which confirmed this diagnosis. Nothing special was noticed concerning the relative strength of the radial pulses.

On the following morning, with a clear diagnosis of fracture through the anatomical neck of the humerus with displacement of the head of the bone into the axilla, the writer proceeded, with the assistance of Dr. Dixon (ether anæsthesia by Dr. F. M. Storer), to remove the displaced head, which was plainly too far from the glenoid to retain any of its blood-supply.

The incision chosen was one at a right angle with and crossing the anterior fold of the axilla and extending into this cavity. The object of thus placing the incision was to obviate the bow-string scar which often follows the conventional wound laid along the course of and below the anterior axillary fold. The transverse incision gave excellent access to the axillary contents and the pectoral muscle was held up by a retractor.

There were no bleeding vessels and no great amount of blood clot between the tissues. There was considerable laceration of the pectoralis major muscle. The dislocated head lay freely exposed in the wound with its articular surface presenting and its fractured surface impacted into the packet of vessels and nerves. (Fig. 1.)

The head was taken between the thumb and fingers and lifted from its bed with but little force. Its removal was followed by a spurt of blood from a transverse wound in the axillary artery which had been made by the rough bony surface and plugged by the same agency. (Fig. 2.)

The artery, being already fully exposed, was easily controlled by the fingers and then by a loop of tape passed around it about 1½ inches above the point of injury and tied just tight enough to control the circulation. A careful examination was then made of the injured portion of the artery and it was found that the vessel was torn across about four-

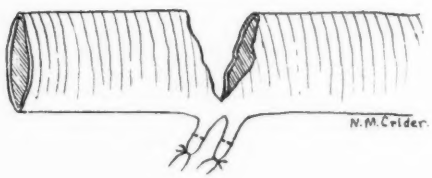

Fig. 3.

fifths of its diameter, at a point exactly opposite the emergence of two considerable sized branches which were undoubtedly the subscapular and posterior circumflex. (Fig. 3.) A rubber-protected clamp was placed on the distal segment, which subsequently acted as a holder to manipulate the distal stump. (Fig. 4.)

The intima of the lacerated vessel was separated and curled inward and it was evident that repair by simply suturing the lacerated edges was impracticable and that by resection only could smooth edges be secured. This necessitated removal of the portion carrying the branches, and, after they had been tied off, this was done.

When the transverse section of the stumps had been made and the stumps gently squeezed with the fingers to insure against retention of blood-clot, the suturing was begun with the finest available silk thread and delicate curved intestinal needles. It was intended to pass the sutures through all the coats, but it was at once discovered that the intima was so calcareous that the needle would not pass through it but broke it into shreds. The edges were again trimmed and the sutures inserted through all the coats but the intima. (Fig. 5). Two interrupted sutures were placed at opposite points of the circumference and their ends seized with forceps and these acted as guy sutures. Four or five interrupted sutures were placed between these on each side—front and rear. (Fig. 6.)

The lower clamp was removed and then the tape loosened. Slight leakage at two points required the insertion of two additional sutures, which had the desired effect of completely controlling all oozing. Pulsation of the vessel below the suture was normal but doubtful at the wrist. The hand, however, which, after the artery was clamped, had become cold, soon recovered its heat.

It was desired to cover the point of repair by a flap of tissue, but none was available. The cavity was drained by two cigarette drains on account of the dead space and the muscle injury, and the incision closed with buried sutures of catgut and superficial sutures of silkworm gut.

Before closure a provisional loop of catgut was placed about the artery high up and left very loose, so that it could make no constriction, but could be used in case of hæmorrhage. The ends were brought out alongside the drains. The arm was bound to the chest and the wound put up perfectly dry.

Patient made a good recovery but has never had a

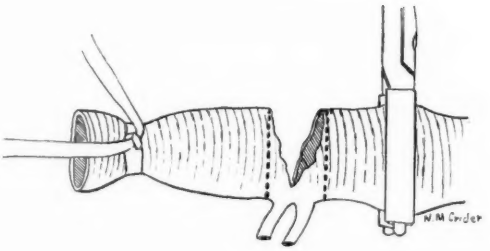

Fig. 4.

distinct radial pulse and up to the time of writing has considerable muscular spasticity and some limitation of motion at the shoulder. It is uncertain whether the spastic condition is due to the injury of the brachial plexus or to the impairment of blood supply.

REMARKS ON THE TECHNIQUE

The writer, having had no previous experience in arterial suture in man or animals, and being taken unawares by this unexpected complication, was obliged to do the obvious thing, without sufficient familiarity with the beautiful technique of Carrel to exactly follow his method.

The use of Carrel's three guy sutures instead of the two employed would perhaps have facilitated the suture somewhat; but no great inconvenience was experienced in steadying the stumps for the intermediate sutures.

The silk used was the most slender that was at hand, being such as is used by oculists; and the needles were curved and the most delicate that are obtainable for intestinal suture. Interrupted stitches were used instead of continuous; for the reason that the writer has noticed in two or three cases, a delicate annular stricture at the anus after continuous circular suture in resection of the pile-bearing area for hæmorrhoids, and is of the opinion that a series of interrupted sutures is less likely to have this result.

ABSTRACT OF CASES HITHERTO REPORTED OF CIRCULAR SUTURE OF ARTERIES [1]

1. *Krause, Fed.*, of Altona. 1895. Reported in 1899. Resection of *femoral* artery and vein in course of extirpation of growth. Invagination. Pulsation felt at once. Gangrene occurred and am-

[1] Cases of arteriovenous anastomosis are not included.

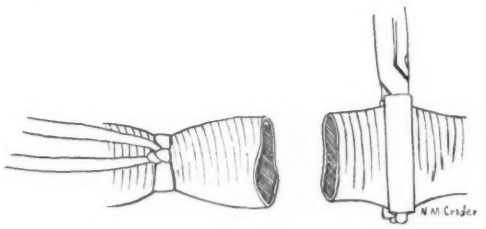

Fig. 5.

putation 6 weeks later. Recovery. Deutsche med. Wchnschr., 1900, Nr. 13, p. 82.

2. *Murphy, J. B.*, of Chicago. October 7, 1896. Shot wound of *femoral* artery. Invagination. Pulsation returned in dorsalis pedis in 4 days. Recovery. Medical Record, 1897, li, 73.

3. *Murphy, J. B.*, of Chicago. May 15, 1897. Circular suture of *axillary* artery for revolver bullet wound. $\frac{5}{8}$ cm. resected. Invagination. Feeble radial pulse before and after. Recovery. Comptes Rendus du xii. Cong. Int. de Med., 1897, v, 386.

4. *Kümmel, H.*, of Hamburg. April 28, 1899. Resection of 4 to 5 cm. of *femoral* artery in course of extirpation of growth. Invagination. Pulsation felt in popliteal in a short time. Recovery. Beitr. z. klin. Chir., 1900, xxvi, p. 128.

5. *Delanglade.* October 2, 1902. Wound of forearm just below elbow. *Radial* and *ulnar* arteries sutured end-to-end with silk. Circulation returned at once in hand, which was without circulation before. Recovery. Bull. et mém. Soc. de Chir. de Par., 1903, n. s., xxix, 401.

6. *Ferguson, A. H.*, of Chicago. October 20, 1902. Shot wound of *femoral* artery. Invagination. Embolism of calf forty-one hours later, followed by amputation of half of foot for gangrene. Annals of Surg., 1903, xxxvii, 719.

7. *Stewart, Francis T.*, of Philadelphia. June 16, 1905. Wound of *brachial* artery by flying steel. Resection and invagination. Radial pulse did not return till the next day. Recovery. Annals of Surgery, 1908, xlviii, 152.

8. *Brougham, E. J.*, of Chicago. August 18, 1905. Stab wound of *axillary* artery. Invagination. Radial pulse returned same evening. Surg., Gynec. & Obst., 1906, ii, 410.

9. *Stewart, Francis T.*, of Philadelphia. May 23, 1906. Bullet wound of *brachial* artery. Resection and end-to-end suture with silk through all coats. Feeble pulse restored at once. Recovery. Annals of Surgery, 1908, xlviii.

10. *Lexer, E.*, of Königsberg. May 26, 1906. Resection of *popliteal* artery in extirpation of traumatic aneurism. Payr's magnesium ring. Pulsation returned at once. Recovery. Arch. f. klin. Chir., 1907, lxxxiii, 459.

11. *Lexer, E.*, of Königsberg. 1907 (?). Transplantation of 8 cm. of saphenous vein to fill defect in *axillary* artery due to injury from attempt at reduction of three-weeks-old luxation of humerus. Method of Carrel. Death in 5 days from delirium tremens. Autopsy showed artery pervious, with thrombus in part of its lumen. Arch. f. klin. Chir., 1907, lxxxiii, 469.

12. *Martin, E.*, of Cologne. August 25, 1907. Resection of 3 cm. of *brachial* artery for complete laceration from compound dislocation. Circular suture by Carrel's method with finest intestinal silk and needle. Provisional loop of catgut placed but not required. Radial pulse returned at once. Recovery. Mediz. Klin., 1908, iv, 1455.

13. *Braun, H.*, of Zwickau. January 13, 1908. Laceration of *abdominal aorta* in removal of post-peritoneal neoplasm. Resection of 2 cm. and end-to-end suture by Carrel's method with celloidin thread. Pulse returned at once. Recovery. Verhandl. d. deutsch. Ges. f. Chir., 1908, 104.

14. *Enderlen*, of Würzburg. Resection of 4 cm. of *popliteal* artery during extirpation of aneurism. End-to-end suture. Re-establishment of circulation and healing. Quoted by Gobiet. Deutsch. med. Wchnschr., 1908, Nr. 38.

15. *Stich, Rudolph*, of Bonn. February 24, 1908. Resection of 1 cm. of *popliteal* artery for arterio-venous aneurism from flying piece of steel. Pulsation in dorsalis pedis next evening. Recovery. Deutsch. Ztschr. f. Chir., 1908, xcv, 577.

16. *Gobiet, Josef*, of Orlau. Stab wound of *axillary* artery severing three fourths of its calibre. Artery cut through, refreshed and united by Carrel's method. Radial pulse returned next day. Recovery. Wien. klin. Wchnschr., 1909, Nr. 42, 1433.

17. *Gobiet, Josef*, of Orlau. Laceration of *popliteal* artery with compound luxation of knee and extensive injury of joint and soft parts. Resection of 6 cm. End-to-end suture by Carrel's method. Gangrene of leg and amputation at lower third of thigh. Ibid.

18. *Enderlen*, of Würzburg. Resection of 4 cm. *popliteal* artery and vein in removal of sarcoma. End-to-end suture. Recovery. Amputation six months later for recurrence. Münch. med. Wchnschr., 1910, Nr. 36, 1865.

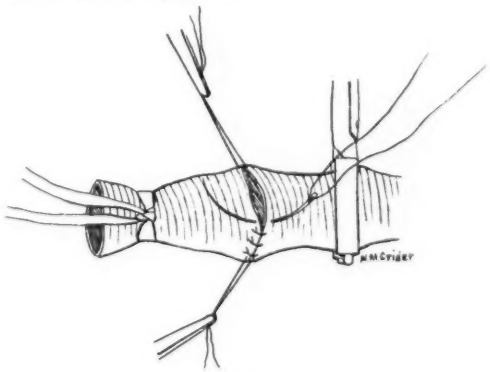

Fig. 6.

19. *Enderlen*, of Würzburg. Resection of *femoral* artery in removal of sarcoma. Transplantation of 15 cm. of saphenous vein from the other limb. Smooth healing. Recovery. Ibid.

20. *Schmieden, v.*, of Berlin. July 30, 1908. Thrombosis of *brachial* artery from severe elbow fracture four days before. Resection of 2 cm. Circular suture by Carrel's method. Radial pulse did not return for nineteen days. Recovery. Berliner klin. Wchnschr., 1910, Nr. 13, 571.

21. *Grasmann, Max*, of Munich. November 30, 1908. Resection of 2 cm. of *femoral* artery and union by simple suture, in a patient moribund from hæmorrhage, caused by a pick wound, half an hour before. Death in three and one half hours. Münch. med. Wchnschr., 1909, lvi, 807.

22. *Ranzi, E.*, of Vienna. May 2, 1909. Resection of 1 cm. of upper third of *brachial* artery for glass wound. Circular suture by Carrel's method. Recovery. Wien. klin. Wchnschr., 1909, xxii, Nr. 42, 1431.

23. *Lieblein, Victor*, of Prag. May 28, 1909. Resection of 2 cm. of *femoral* artery for traumatic aneurism caused by shot wound by Flobert rifle twenty-four days before. Circular suture. Direct compression of external iliac two days before with loop of thread to favor dilatation of collaterals. Recovery with good function. Beitr. zur klin. Chir., 1910, lxvii, 44.

24. *Turner, R. L.*, of Meridian, Mississippi. August 9, 1909. Stab wound of upper *brachial* artery. Provisional hæmastasis with Wyeth's pins and elastic band. End-to-end suture with interrupted stitches of silk through all coats. Radial pulse before and after suture. Recovery. Gulf States J. M. & Surg., 1910, xvi, 420.

25. *Sonnenberg, E.*, of Berlin. August 12, 1909. Resection of ⅓ cm. of *femoral* artery and ligation of vein for wound caused one week before by flying scale of metal. Suture by Carrel's method. Pulse below felt only after three days. Recovery. Deutsche med. Wchnschr., 1910, Nr. 13, 601.

26. *Schmieden, v.*, of Berlin. August 16, 1909. *Axillary* artery injured during operation for removal of cancerous breast. Resected and sutured end-to-end. Artery very brittle from atheroma. Radial pulse returned for two minutes and then disappeared. Circulation remained in arm and patient recovered. Berliner klin. Wchnschr., 1910, Nr. 13, 571.

27. *Papioannou*, of Athens. November 16, 1909. Wound of *brachial* artery at bend of elbow, inflicted twelve days before. Carrel's method of circular suture. Weak pulse returned in seventy-two hours. Recovery. Münch. med. Wchnschr., 1910, Nr. 22, 1179.

28. *Wille, H.*, of Christiania, Norway. December 27, 1909. Circular suture of *brachial* artery for stab wound. Catgut used. Pulsation in radial two days later. Recovery. Norsk. Mag. f. Laegevidenskaben, 1910, No. 5, 530.

29. *Ehrenfried & Crandon*, of Boston. April 23, 1911. Stab wound completely severing common *femoral*. Carrel's method for end-to-end suture. Pulsation appeared in dorsalis pedis on second day. Recovery. Annals of Surgery, 1911, liv, 485.

CONCLUSIONS

The small number of cases of circular arterial suture reported to this date can be accounted for in a variety of ways:

1. The fear of consecutive or secondary hæmorrhage;

2. The expectation of weakening of the vessel with resultant aneurism;

3. The idea that the operation is difficult and requires special skill or previous animal experimentation and special instruments;

4. The belief that thrombosis is to be expected; which will put the procedure on a par with ligation;

5. The opinion that atheroma contraindicates arterial suture. This has been emphasized by numerous surgeons, notably Forgue [1] of Montpellier, Monod and Vanverts[2] and von Schmieden of Berlin;

6. The fact that ligation, in a very large proportion of cases is followed by development of the collateral circulation and a result equal to arterial suture.

Taking up these points in detail, the following facts should be considered:

1. Hæmorrhage has never followed circular arterial suture, and in but one of the reported cases of lateral suture. This is probably due to the reason that, where perfect primary union is not secured by the accurate suture, thrombosis will promptly occur, which will sufficiently plug the vessel before the stitches could possibly give way.

2. Aneurismal dilatation has never been observed after arterial suture; this has been shown by an extensive inquiry by Matas.[3]

3. The operation on vessels of the size of the femoral and axillary is no more difficult than many others that the general surgeon daily performs. Animal experimentation to acquire dexterity is certainly desirable but not essential to success for the ordinary operator. Instruments required are only such as are present in every well-equipped operating room.

[1] Le Bull. Med., 1909, xxiii, 891.
[2] Le Bull. Med., Paris, 1909, xxiii, p. 889
[3] Keen's Surgery, 1909, v. 139.

4. Thrombosis undoubtedly occurs after many arterial sutures; but, in the interim, the sutured vessel remains patulous and performs its function till its gradual closure by a thrombus has induced dilatation of the collateral vessels.

5. The writer's case is but one among a number which shows that no harm may result from arteriorrhaphy in vessels markedly atheromatous.

6. Gangrene occurs in a certain proportion of cases of ligature of main arterial trunks (stated by Wolf [1] as fifteen per cent in the cases of axillary ligation) and certainly some of these unfortunate results can be saved by circular suture.

MULTIPLE MYELOMA

By T. W. STUMM, M. D., St. Paul, Minnesota

THE term multiple myeloma refers to a new growth occurring in the bone marrow, especially in the sternum, ribs, vertebræ, and less frequently in the skull and some other bones. It is characterized by cells that are very similar to certain normal cells in the bone marrow, and the gradual gradation of tumor cells into the normal marrow cells, by the fact that metastasis is not present, at least not as in ordinary malignant tumors, if at all, though it may involve the soft parts by continuity of growth and lastly by the fact that the growths are multiple, as the term implies, and probably occur as such from the very beginning.

The condition is rare, though when one searches through the literature the number of case reports are probably fifty. There is not an exact uniformity in the descriptions, however, and doubtless some of the cases that have been described under this head do not really belong to the myeloma class. In 1907, Pernim collected all of the reported cases (40), and came to the conclusion that not more than twenty of the reports were, in the strict sense, cases of myeloma. In 1873, Rustitzky described the first case very carefully under the head of myeloma multiplex. During the next two or three years, after attention was once directed to the condition, several typical cases were reported. While one might think the similarity was so close that this term would have been adhered to in all the cases afterward described, it has not been so, and individual pathologists have used terms such as sarcoma multiplex ostium, pseudoleucemia myelogenes, osteomyelitis maligna, plasmoma malignum, ostitis sarcomatosa, erythroblastoma, endithelioma intravascularæ, lymphodema ossium, myelosarcoma, lymphosarcoma multiplex ossium.

The descriptions of the individual cells in these various reports are not such that it can be said definitely just which ones belong to the same class, though in not a few of the reports, the descriptions of the individual cells are practically the same. Menne in 1906 went into a very careful analysis of the case reports and tried to select the typical cases of myeloma from heterogeneous tumors of the bone that had been reported as myeloma. Clinically the cases are not easily recognized and doubtless may have escaped detection. Middle-aged men are usually affected, though there is a report of a very typical case in a man of seventy-two. Women are not exempt from the condition. In the history, the date of the onset is usually indefinite, as will be noticed from the histories of the case reports here. Pain in the limbs and a general feeling of lassitude are probably the most frequent early complaints; these in the beginning are not constant and may disappear for a time altogether, to reappear with increased severity and duration. Sometimes the remissions will last for months and the patient will gain weight, and both he and the physician will be inclined to think that the patient is on the road to recovery, but relapses are as sure to

[1] Beitr. z. klin. Chir., Bd. 58.

come here as in pernicious anæmia. As the disease progresses, not only the limbs, but the back, arms, chest, in fact nearly the whole body becomes painful, especially to pressure. Spontaneous fractures are not uncommon, and before the end, which is usually by exhaustion, the patients are bedridden, having probably kept up and about for months, or a year or so, by the aid of a stick or crutches before taking entirely to the bed. In a good many of the cases, tumor masses of varying size are detected in the sternum, though external protuberances are frequently not present at all, and the case goes to autopsy with no external signs of a tumor. One fairly constant pathological finding is in the urine; this substance was first discovered by Bence-Jones, and since known as the Bence-Jones body. It is not uncommon, though not constant, and when found is not pathognomonic of the condition, though its presence speaks much in favor of it. This substance was at first considered as an albuminose, but the work of Magnus-Levy and Lindelmann has excluded it from this group and put it in that of native proteins. It is not known just what the substance is, hence the name Bence-Jones body. This peculiar body occurs in varying amounts, from one to seven per cent. It is precipitated by nitric acid, or sodium chloride and acetic acid, the latter reaction only occurs when the urine is heated to 50° or 60° C. The precipitate is of a peculiar milky, yellowish white material that disappears by further heating, leaving a perfectly clear solution. On cooling, the precipitate reappears. When heated, the precipitated material has a tendency to stick to the sides of the tube. Under the microscope it is amorphous.

Pathologically the gross appearance of the bones is rather characteristic and constant, though there have been cases of carcinoma that were thought to be myeloma from the gross appearance. The sternum, ribs and vertebræ are brittle and can be easily cut with a knife. The outer bony shell can frequently be crushed between the fingers and in places the whole bony structure may be absorbed, though the periostium is not broken through. In removing the bones they are easily broken and old, spontaneous fractures are frequently found. On cut section the surface is gray, yellowish-gray or more frequently reddish-gray in color. Large areas may show, or the surface may be mottled with areas varying in size from a pea to a silver dime. The trabeculæ are more or less absorbed, according to the progress of the disease, and in their place is a fine, delicate supporting connective tissue, as seen under the microscope. The tumor cells proper are usually thick-set, and make up the whole tumor mass with the exception of the small amount of supporting stroma. The cells are very similar in character in the inner part of the mass, but at the circumference the gradation into the normal bone marrow cells is very gradual, and one cannot see just where the tumor ends and the normal bone marrow begins. Very thin-walled vessels composed of only an endothelial layer are present to a greater or less degree. The individual cells are seldom perfectly round, but polygonal, due to pressure; the diameter varies, but is usually about one two-thousandth of an inch. In six cases studied carefully by Christian under identical hardening and staining conditions, there was a remarkable uniformity in the cellular findings. There is usually one large eccentrically placed nucleus, though there may be two or three; a nucleolus is frequently present. Small dark staining bodies are often seen; these are supposedly centrosomes. The protoplasm is homogeneous and has a ground glass appearance, or shows very fine basophilic granules. There has been a single report only in which neutrophilic granules were present. Christian, in summing up his findings, says: "A histological study of six cases of myeloma shows a striking similarity of cell structure with differences of minor degree. The common characteristics of the cells are a finely granular, slightly basophilic cytoplasm, an eccentrically placed nucleus, a nucleolus, centrosomes, a nuclear membrane and a tendency to mural arrangement of the chromatin. With these characteristics there is a greater resemblance of the tumor cells to bone-marrow plasma cells than to myelocytes. In most of the cases reported by other observers the cells show these characteristics, and these tumors form a group within which the

cells of individual cases show no greater variation than occurs in other tumor groups."

The exact nature of the cells has been a matter of much study and no small amount of controversy. They are probably developed from some normal cell in the bone marrow, whether this be a bone-marrow plasma cell, a myelocyte or from an erythroblast. The latter two sources, however, seem to have fewer supporters, though Sternberg found neutrophylic granules in one case, and Ribbert thought the cells in his specimen were erythroblastic in nature. This latter contention has been especially strongly controverted; most pathologists consider them as plasma cells, though it is just possible that, while the origin is from normal cells in the bone marrow, the same cell multiplication may not have occurred in every instance, and some may originate from plasma cells, some as premyelocytes, and possibly, though not probably, some from erythroblasts.

In this short outline of the condition, I have only attempted to give a general idea of it, since in such a paper it is not possible to go into the discussions that have arisen over many things connected with the etiology and other less important factors.

The case reports that follow are both typical, and present findings clinically and pathologically in accordance.

CASE 1. A. P., 58 years, single, farmer, German. August 8, 1906.

Present trouble began in August, 1905, with a feeling of weakness in the legs. At first this came on after a hard day's work, but soon increased in severity so that he could scarcely walk. The legs were now stiff (spastic) as well as weak. This condition was so marked he thought the legs were becoming paralyzed. There was slight pain, starting in the small of the back and radiating down the legs along the course of the sciatic. He had no other complaint whatever. After two or three months the condition improved and he was able to work on the farm, but not perform full duty during the winter. In the spring of 1906 the condition got worse, increasing very gradually in severity. On August 8th he entered the City and County Hospital in St. Paul. He could now walk around a little by supporting himself by the bed, on a chair or on a cane. He complains of pain in the small of his back radiating down the thighs and legs. When lying on his back he rests very comfortably. He can eat fairly well; has some cough, but raises very little. On two or three occasions lately he has had distinct chills. He has lost some weight, but does not know how much.

Past illness. Has formerly had rheumatism. He denies all other diseases.

Family history. Father died of old age, mother of tuberculosis.

Habits. Uses tobacco and alcohol moderately.

Examination. Patient is an old man, well developed, rather poorly nourished, lying supinely in bed. He is apparently in no pain when quiet, but when attempting to turn over or sit up he cries out with pain in his back. He speaks English brokenly, and the history can only be secured in detail by speaking German to him.

Head. Scalp negative. Eyes blue, pupils of moderate size; react to light and accommodation. Nose and ears negative. Mouth, lips thin and pale; teeth in fair state of preservation, tongue thin and pointed, clean, tonsils and pharynx show nothing abnormal.

Neck, long and slim; no palpable glands.

Chest shows a peculiar flaring shape, being thick anterio-posterior and considerably larger below than above. When he breathes deep he complains of a sticking pain in the back. Expansion poor; no excursion to be made out. Percussion is hyperresonant all over. Palpation with only very moderate pressure on the lower sides of the chest causes him to cry out with pain, which he locates in the dorsal region. This is more marked on the left side. Auscultation reveals a prolonged expiration. Posteriorly, especially on the right side, one hears fine râles inspiratory and expiratory. Over the lower part a fine to-and-fro rub is heard. When one taps along the vertebral column he complains of pain in the lower dorsal region. He is persuaded with some difficulty to sit up. This he can only do by hanging the feet over the side of the bed and then holding on to the bed with the hands. He holds himself very rigid and moves slowly and cautiously. When asked to walk he gets up very slowly, the whole body being rigid, and slides the feet along in a very spastic manner.

Heart. Dullness small, tones weak but clear. The radial pulse is small but regular. The arteries are not especially hard.

Abdomen not distended; tympanitic; not tender. Liver dullness above at seventh rib, not palpable below. Spleen not palpable.

Extremities. Upper normal; lower are held rigid. One can straighten the legs out, but he by preference holds them flexed. When they are straightened out he complains of pain along the posterior part of the thigh and in his back.

Nervous system. Knee jerk much exaggerated. The feet are held very spastic, though no clonus is elicited. No Babinsky. Touch, pain and muscular senses are normal.

Urine, October 8, 1906: Acid — s. g. 1020 — Alb. 0 — Sug. 0 — Oxalates present. October 23, 1906 ac. — s. g. 1023 — Alb. 0 — Some epithelial cells present.

Note. During the patient's stay in the hospital he was in bed nearly all the time. Now and then he could sit up for an hour or two and could sometimes walk around the yard, but always with much difficulty. He looked sick all the time and gradually lost from the time he came until he died. He said all the time he was gradually weaker. There was no change in the findings save he became more rigid and the lower extremities more spastic. A good part of the time he had one or two degrees above normal temperature.

On January 24, 1907, a red, inflammatory area appeared under the left eye, covering the cheek. This was diagnosed as erysipelatous. On the 30th the redness was gone, but the patient became weaker and weaker until he died.

The clinical diagnosis was made of, (1) pulmonary emphysema, (2) adhesive pleuritis on both sides, (3) pressure on the cord, probably due to caries of the vertebræ. The pleuritis and vertebral condition both probably tuberculous.

Autopsy January 30, 1907.

General. The body is that of a well-developed, poorly nourished old man. Externally there are no special marks or scars. Postmortem rigidity fairly well marked; postmortem lividity moderate on posterior part of the body.

Head. Scalp negative; ears negative; eyes, the left pupil is slightly the larger, right of moderate size; nose negative.

Mouth. Lips thin and pale; gums pale and firm; slightly ulcerated where they join the teeth. Teeth fairly well preserved.

Neck long and slim, otherwise negative.

Glandular system. There are no palpable superficial glands.

Abdominal cavity. Musculature and fat greatly reduced; diaphragm on right side reaches to the fourth interspace; left same. The lower border of the liver reaches the costal edge. The lower border of the stomach two fingers' breadth above the level of the umbilicus. The great omentum contains practically no fat and is very thin. The transverse colon is U-shaped and reaches nearly to the symphis pubis. The appendix is free and lies above the brim of the pelvis. The intestines are only moderately distended. Peritoneal cavity dry; lining smooth and glistening.

The tongue is dry and covered with a whitish dry coat; is firm; on section the musculature is red. Tonsils small and fibrous.

The thyroid gland is apparently normal. The mucous membrane of the œsophagus is pale and smooth. Epiglottis is normal.

Chest. In removing the sternum from below upward great friability is observed, it having broken in several pieces. When one presses it between the thumb and fingers it crushes and crackles like an egg-shell. In any part of it one can easily indent it with the pressure of the thumb.

Pleural cavity. The lungs meet in the median line and for a distance of 6 cm. Both pleural cavities are obliterated by firm, fibrous adhesions which can only be torn with great difficulty.

Pericardial cavity. Perfectly smooth; contains a few cubic centimeters clear fluid. The left lung is large; the surface is bloody and covered with many fibrous tags. Interlobar fissure is entirely obliterated. Externally, the light pinkish lung tissue shines through the fibrous adhesions. In other places the lung tissue is entirely covered with adhesions. The lung crepitates throughout, less in the lower posterior part. On section the lung tissue is light in color, almost dry and perfectly smooth. Around the large bronchi are some large anthricotic glands. The right lung externally is similar to the left in the upper and middle lobes. The lower is much darker, and firmer in consistency. The posterior part of the upper and a large part of the lower do not crepitate. On section the lower lobe has a mottled appearance, whitish and bluish. The surface is smooth and moist. Some red, bloody, frothy fluid can be squeezed from the bronchi. The other portions are similar to the other lung.

The heart is a little larger than the owner's fist. The apex is made up entirely of the left ventricle. The mitral orifice admits two fingers snugly; the tricuspid admits four finger tips. The right auricle is filled with a large, goose-fat clot. The aortic valves are competent to the water test. The left ventricle is firm and solid; in it is a goose-fat clot; the right ventricle is empty. The musculature of the right ventricle is of normal thickness and firm; the endocardium is smooth; the tricuspid valves show no abnormal changes. The endocardium of the right auricle is normal. The musculature of the left ventricle is slightly thickened and firm. The endocardium of the left heart normal. The aortic and pulmonary semilunar valves are normal. The beginning of the arch of the aorta is smooth.

The kidneys are of the same size, about normal. Smooth and purplish in color; firm in consistency; cut with normal resistance. The glomeruli show plainly. The medulla and cortex show normal relation in thickness. The capsules strip with slight difficulty, tearing in places. The surface beneath is slightly granular. One small subserous cyst as large as a pea is present. This is filled with clear, thin fluid; the kidneys are similar on section.

The liver of about normal size, dark and smooth. Gall ducts are patent; the bladder is distended with moderately thick bile. The liver cuts with normal resistance. On cut section it is dark and smooth. The markings are fairly distinct.

The spleen is small, of moderate consistency, and pale in color. On section is reddish; the markings are clearly seen; rather dry.

In the mesentery are a number of small, yellowish, irregular, stone-hard masses. These vary in size from a small shot to a large pea. The peritoneum is perfectly smooth. A section made into the intestine at the junction of the ilium and colon shows normal mucus membrane. The stomach is negative.

The ribs are very soft and friable. The outer

part is smooth; one can crush them between the fingers with only slight pressure, causing the outer thin covering to crackle like the shell of an egg. The inner part and the marrow are red, pulpy and granular. The sternum is very similar in appearance to the ribs.

The bones of the vertebral column show the same friable condition as the ribs and sternum; especially is this true in the lower dorsal and lumbar regions; one can with slight pressure force the fingers through the friable crust and into the vertebral canal. The clavicles are firm and externally appear normal. A section about eight inches in length taken from the middle of the femur shows a normally appearing, solid, bony tissue, but the marrow is quite red in appearance, though of normal consistency. A section of the vertebral column consisting of the lower dorsal and lumbar vertebræ is taken out without difficulty. One can cut it with a knife or saw through it much like rotten, worm-eaten wood. On section the thin outer crust covering is seen. Inside this the whole section down to the canal is soft, finely granular, spongy and reddish in color. The intervertebral cartilage is reddish and jelly-like. The spinal cord is easily separated and the membranes show no appreciable change. The bony tissue surrounding the canal is not broken down.

The skull cuts with normal resistance; is thin, though apparently normal.

The brain. Weight 1,360 gm. The pia-arachnoid is here and there slightly thickened, especially between the convolutions. This is shown as a slightly yellowish-white fibrous deposit. The upper and lateral portions contain most of the deposit. On section the brain shows nothing abnormal.

Microscopic examination. Specimens from the pathological portions show a thick-set, cellular tissue with very little connective stroma. The tumor cells are about 15 m. in diameter. The nucleus stains deeply and is excentric; frequently there is more than one nucleus. Some of the cells are in a state of division. A nucleolus is present. The cell body stains reddish, though some cells have a tendency to take the basic stain throughout. There are no granules, though the protoplasm is not quite clear and homogeneous. In some areas the tumor cells and the bone marrow cells are intimately mixed. The tissue is rich in thin-walled blood-vessels. The polygonal outline of part of the cells is probably due to pressure.

CASE 2. M. N., aged 46, laborer, Finlander, married, July 3, 1911.

Diagnosis. Multiple myeloma; pulmonary emphysema.

Present trouble began early in the spring of 1910. Up to this time the patient had always been a perfectly well, strong laboring man, weighing two hundred pounds. He first began to complain of a pain in the right limb, extending from the hip downward, most marked in the region of the sciatic nerve. This was not constant or very severe in the beginning, but after two or three months it became severe enough to make him limp. About that time he began to complain of an aching pain in the small of the back. During the summer the condition got better but in the fall it came on again with increased severity and now extended to his right arm and the right side of the chest, with a quite constant severe pain on the left side just above the scapula. Early in the fall the condition was so bad that the patient had to remain in bed practically all the time. He lost a great deal of weight and was quite miserable. His appetite was poor and he vomited nearly all the solid food that was given him. After two or three months he began to improve and gained materially in weight, feeling very much better in every way. Early in the spring of 1911 he began to grow worse again and became more miserable than ever. He came in on the train this morning, after having ridden all night; he says the jolting of the train caused him so much pain that he will never return unless he feels much better.

Past illness, none. Family history good.

Examination reveals a well-developed, poorly nourished foreigner who speaks English poorly and gives his history through an interpreter. He is lying in bed, though with great exertion and much pain he is able to raise himself up in a sitting posture, or even get out of bed. When he tries to sit up the muscles of the body are all contracted and tense. When he gets out of bed he moves himself very slowly and cautiously, and when standing on his feet the muscles of the body and limbs are tense and the feet held far apart; with great difficulty he can walk a little with the body bent forward and the legs held spastic.

Head. Scalp negative; eyes, ears and nose negative. Mouth: the lips are dry and slightly parched; the gums are soft, pale, spongy and bleed easily; the teeth are in a poor state of preservation; the tongue is dry and covered with a brownish coating; tonsils and pharynx negative.

Neck. In the region of the thyroid on the left side is a fairly firm nodular mass about the size of a hen's egg; this does not pulsate and is not painful.

Chest full, thick anterior-posteriorly, expansion poor, excursion limited. When one makes gentle pressure over the ribs, sternum or vertebral column the patient cries out with pain. Over the clavicle or on the arms, such is not the case. Even gentle percussion of the chest causes much pain. The lungs are hyperresonant throughout and expiration is prolonged. The heart is negative.

Abdomen slightly prominent, not tender, and tympanitic.

Abdominal ostia closed.

Rectal examination negative.

Glandular system negative, save the prominence in the neck, in the left, or slightly to the left, of the thyroid.

Nervous system. Sensation to touch and pain normal; reflexes normal.

Blood examination. H. b. 40 per cent (Fl.);

reds, 1,920,000; whites, 11,000. Microscopic examination: reds, negative; of the 11,000 whites 40 per cent are large mononuclears without granules.

Urine. Voided specimen: color, light amber; appearance, clear; sediment very slight; s. g. 1010; reaction acid. Microscopic examination shows a few epithelial cells, an occasional white cell, a few granular casts and a little mucus. Chemical examination reveals a beautiful, well-marked reaction for the Bence-Jones body.

Note, July 6th. The patient has been fairly quiet since he came into the hospital until to-day, when he became very restless, complaining of much pain in the hips; he has been sitting up a little but does not eat very well.

July 8th. The patient is not doing well at all. He complains of a great deal of pain this morning. The pulse became very weak during the night and was counted with difficulty. He was restless and is now breathing hard. His pain is so great that morphia is administered.

July 10th. Patient still very restless and uncomfortable; he has become so noisy that he was ordered taken to the ground floor. His bowels are moving involuntarily and quite frequently.

July 24th. The patient is growing weaker and becoming very much emaciated; he takes very little food, has involuntary bowel movements; is listless. It has been necessary to keep him quiet with hypodermics of morphia until to-day.

July 26th. The patient has gradually grown weaker until this morning, when he died.

When the patient came into the hospital he had a temperature of 100.4° and pulse 96. His temperature has varied from 99° to 103° and his pulse from 86 to 140 since he was under observation.

Autopsy, July 27, 1911.

General. The body is that of a much-emaciated male, passed middle age. Postmortem rigidity slight; lividity fairly well marked posteriorly. In the lower sacral region there is a decubitus as large as the palm of the hand. Subcutaneous fat almost gone.

Head. Skull negative. Eyes and ears negative. Tongue is dry and covered with a brownish fur.

Chest. Subcutaneous fat almost disappeared; musculature of the chest very thin; when one attempts to cut the sternum it breaks very easily; longitudinal section of this bone shows rather marked absorption of the bony structure; in some places the absorption reaches almost to the outer edge of the bone. The marrow and material within is mottled, showing a reddish-gray material, varying in size from a pea to several centimeters in length. The consistency is fairly firm and in some places is still connected with the bony shell; when the edge of a knife is drawn across the surface, parts of it grate, while other parts are smooth and homogeneous. In places the outer bony shell separates from the material within, while in other places the attachment is more or less firm. The outer bone is so thin that it breaks easily with the point of the knife.

Pleural cavity. The pleura, both visceral and parietal layers, smooth. The left lung is smooth, large, dry and light grayish in color in front; posteriorly, it is a little more firm and the color is darker. The tissue feels feathery, especially above and in front. On section the surface of the lower lobe is smooth, moist and reddish-brown in color; considerable liquid exudes from the surface on pressure. Section of the upper lobe shows a smooth, dry pinkish-gray surface. Right lung: the same description applies throughout as to the left. In the left pleural cavity, well up in the apex close to the vertebral column, is a mass larger than a hen's egg, attached firmly at its base to the first, second and third ribs, and to their corresponding vertebræ. The surface of this mass is smooth and decidedly nodular. The surface is reddish-gray in color. The consistency is firm, though not cartilaginous.

Heart and pericardial cavity. Both the parietal and visceral layers are smooth; the heart is about as large as the owner's fist, firmly contracted. On section the musculature is brownish-red; the endocardium of the left ventricle is everywhere smooth; the aortic cusps are smooth and thin; the beginning of the aorta shows a few yellowish non-elevated spots and one or two smooth plaques. The mitral orifice admits the tips of three fingers; the leaflets are perfectly smooth; the endocardium of the left auricle is grayish in color. The right ventricle is large in comparison to the left; the walls are decidedly thin and less firm in consistency than those of the left. The lower part of the cavity reaches well down to the apex, of which it forms a part. The tricuspid orifice admits three fingers; endocardium of both auricle and ventricle, smooth.

Peritoneal cavity. The great omentum is practically absorbed; both the parietal and visceral layers are smooth. There are a few adhesions between the omentum and the lower edge of the liver; the liver reaches down to the costal edge. The diaphragm on the right side reaches to the sixth rib; on the left side, to the sixth interspace. The transverse colon and duodenum are rather firmly attached to the under surface of the liver and gall-bladder by firm fibrous adhesions.

The spleen is rather firmly attached by some old fibrous adhesions; it is only slightly enlarged; the surface is dry, wrinkled and grayish-purple in color; the consistency is about normal; on section the surface is smooth, moist, reddish and shows the trabeculæ plainly.

The liver is almost normal in size and average consistency, smooth and decidedly yellowish-brown in color. The gall-bladder extends down about two fingers' breadth below the edge of the liver. On section the liver surface is moist; the lobular markings are very distinct, the central veins being surrounded by large, yellowish areas. The gall-bladder is moderately distended with thin, yellowish bile; the mucosa is thin and smooth.

The left kidney is large and smooth; the external surface is dry and purplish in color; the surface on

section is moist; the relation of the medulla to the pyramids is about normal. The glomerular markings show up fairly distinct; the surface is decidedly gray. The capsule strips readily and leaves a mottled, yellowish-purple surface beneath. The right kidney is a little smaller than its fellow, otherwise the same description applies.

The stomach is about normal in size and in normal position; the mucosa is dark and decidedly smooth.

The pancreas is of normal consistency and on cross section there are no changes to be seen.

The prostate is small, of normal consistency, and smooth.

On carefully cutting the musculature away from the ribs, with gentle manipulation the ribs fracture in some places. The body of the ribs is so soft and friable that the surface is cut away with a shear without the least difficulty. The bony structure of the rib is no thicker than writing paper; within this bony shell is a mottled, reddish-gray material in which are fine, bony trabeculæ. In places a soft, gelatinous material entirely fills the space; in other parts the consistency is firmer. The gray spots are less evident. On the inner surface of the seventh rib, about 3½ inches from the cartilaginous attachment, is a firm protuberance on the pleural side about 1¼ inches long, covering the width of the rib and about ½ inch high. The consistency of the protuberance is decidedly soft, and crackles like an egg-shell. On the second and fifth ribs are similar enlargements, though a little smaller in size.

In sawing the vertebral column in the upper cervical region, the consistency of the bone is about that of worm-eaten wood. The bodies of the vertebræ when removed show on cross section a lamella of bone externally, while the inner part is composed of reddish-gray masses.

The cranium cuts easily with a saw; on cross section one notices a decided layer of reddish-gray, granular material; this is more marked laterally and in front; in the upper part in the frontal bone is an area as large as a silver half-dime, non-elevated, slightly rough over the surface and reddish in color; this extends through the whole thickness of the skull and spreads out on the inner side. The lesser trochanter of the right femur shows some of the same reddish degeneration.

The thyroid is smooth and firm and the left lobe is of about normal size, slightly compressed, though otherwise appears normal. The right lobe is nodular and about three inches long and one and a half inches broad in the widest part, slightly tapering below. The surface is dry, smooth and light in color; on section, smooth and slightly yellowish. Just at the side of the left lobe is a smooth nodular mass about the size of a hen's egg; this mass is loosely attached to the tissues around it. The surface is dry, smooth and yellowish in color; on section one sees a collection of soft, yellowish debris with some yellowish, dirty, thin fluid. Around the outer part of the mass is a distinct plate of bone entirely surrounding it; this bone plate is about as thick as an ordinary wrapping paper.

The brain is negative.

Anatomical diagnosis. 1. Multiple myeloma. 2. Pulmonary emphysema. 3. Parenchymatous degeneration in the liver and kidneys. 4. Calcified encysted thyroid.

Microscopic examination. Specimens from the ribs, sternum and vertebræ show a very similar appearance. The predominating cells are about ten to twelve m. in diameter, though they vary from eight to fifteen. The outline is round if they are not too thickly set, in which case they show evidence of compression. With eosin and hæmatoxylin they stain fairly uniformly. The nucleus is eccentric and quite large in most cells; there is usually one, though not infrequently two. A nucleolus is present and fairly distinct. The cell body stains reddish, though here and there one notices a cell in which the body has taken a decidedly bluish stain, showing the basic tendency to stain darker. These cells, I am inclined to think, are younger and less differentiated. There are no granules in the protoplasm. One can make out a fairly distinct cell membrane. A very fine supporting stroma of connective tissue is present. There are numerous fine blood-vessels with endothelial walls.

The encroachment of the new growth on the bony tissue is very interesting to study. The bone destruction has been a lacunar osteoclastic one. One can see small areas in which the "new growth" cells are encroaching *into* the bony structure, and in some places a small inlet seems to have been made and then a larger area within has been destroyed, the mass of cells that have doubtless been acting as osteoclasts showing within the bony tissue. Sometimes one sees a tumor cell surrounded by several bone cells. These osteoclastic cells are no larger than other ordinary tumor cells. I think, though, that the manner of bone destruction is one of the most important things in the specimens to study, especially since the nature of the destruction shows so clearly.

The liver and kidneys show considerable cell degeneration, but no cells that look like the tumor cells are to be identified. In the kidneys is some colloid degeneration, and in the liver some fatty changes. The spleen shows considerable blood and blood pigment but no other changes.

I have no definite conclusion relative to the true nature of the cells. The fact that some of them take a darker protoplasmic stain than others simply means, to me, that they are of different ages.

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A METHOD OF CONTROLLING POST-PARTUM HÆMORRHAGE BY MANUAL COMPRESSION OF THE ABDOMINAL AORTA

ABDOMINAL SECTION FOR PLACENTA PRÆVIA[1]

BY EDWARD P. DAVIS, M. D., PHILADELPHIA

MOMBURG'S method of compressing the abdominal aorta to control hæmorrhage from the pelvic vessels has called attention to compression of the abdominal aorta in the treatment of acute and alarming hæmorrhage. In ruptured ectopic gestation, in placenta prævia, in accidental separation of the normally implanted placenta, and in rupture of the uterus, this method has been to some extent successful. In post-partum hæmorrhage it has also been used, at times successfully, and at times the continued pressure of the bandage has occasioned such pain as to make its employment for some time impossible.

In dealing with desperate cases of post-partum hæmorrhage, direct compression of the abdominal aorta by intrauterine pressure, in my experience, has proven promptly efficient, and has given opportunity to apply stimulating methods of treatment and permanently arrest bleeding. An illustrative case is as follows:

A multipara, between seven and eight months pregnant, was admitted to the Maternity Department of the Jefferson Hospital, exsanguinated from accidental separation of the placenta. No evidence of placenta prævia could be found by examination. While the patient was being prepared for artificial dilatation and emptying of the uterus, collapse, accompanied by severe shock, developed. The patient was immediately placed upon the operating table; the cervix, which was partly dilated, was dilated sufficiently to permit the introduction of the hand, and the uterus was emptied of its contents. The hand with the closed fist was then carried within the uterus just above the pelvic brim at the bifurcation of the aorta, and the aorta was compressed by forcing the knuckles backward toward the spinal column. An assistant opened a vein in the arm and performed intravenous saline transfusion. Strychnia, ergot, atropine, and digitalin, were given by hypodermatic injection. A hot antiseptic intrauterine douche was administered.

So soon as the patient rallied, the uterus was tightly packed with ten per cent iodoform gauze.

Although the patient was desperately ill, her uninterrupted recovery followed.

Obviously this method is useful only in emergencies and for the temporary arrest of hæmorrhage. Severe pressure cannot be made for any length of time upon the uterine wall, nor can the operator's hand and arm endure the necessary pressure; but to check bleeding promptly and to give opportunity for the application of methods to secure permanent uterine contraction, the method has been found prompt and efficient. It has been employed by myself and my assistants, in cases where it has been necessary to immediately empty the uterus to check bleeding, with positive advantage.

The recent literature of the treatment of central placenta prævia affords numerous examples of the treatment of this condition by abdominal Cæsarean section. The introduction of dilating bags within the cavity of

[1] Read before Sixth International Congress Obstetricians and Gynecologists, Berlin, September 11, 1912. (See discussion, p. 738.)

the ovum through the placenta has given such favorable results in many cases that this method in some clinics has obtained precedence. Where the life of the fœtus is to be disregarded, the Braxton-Hicks method, followed by the spontaneous expulsion of the fœtus, will save, in many cases, the life of the mother at the expense of the child.

There remain, however, a certain number of cases of central placenta prævia where delivery by abdominal Cæsarean section seems indicated.

We may, I think, class these cases properly under ectopic gestation. The original Greek words, ek and topos, describe the attachment of the ovum outside its usual point of adherence, but within the cavity of the uterus. In ectopic gestation, where the ovum is attached within the tube, the ovary, the cornu of the uterus, or the abdominal viscera, surgical interference is recognized as the only efficient treatment. In central placenta prævia the ovum is also attached outside its usual location, under circumstances where hæmorrhage is inevitable and infection is most likely to occur if vaginal delivery be undertaken.

In these cases we believe that surgical treatment by abdominal Cæsarean section is indicated in cases which have not been infected by vaginal packing or manipulation, and where mother and child are in fairly good condition.

We have had occasion to operate upon seven cases of placenta prævia by Cæsarean section, with the recovery of all the mothers and three of the children.

CASE 1. Multipara, exsanguinated, child dead. Porro operation, followed by transfusion. Recovery.

CASE 2. Multipara aged 42. Profuse bleeding, child living. Porro operation. Mother and child recovered, the mother nursing the child partially.

CASE 3. Multipara. Central placenta prævia, profuse bleeding, patient exsanguinated, the child dead. Classic Cæsarean section, packing of the uterus with gauze. Transfusion. Mother made good recovery.

CASE 4. Multipara. Central placenta prævia. Profuse hæmorrhage, child dead. Classic Cæsarean section with packing. Mother made a good recovery.

CASE 5. Primipara. Central placenta prævia. Undilated, resisting cervix. Profuse hæmorrhage. Delivered by classic Cæsarean section, with guaze packing of the uterus. Mother suffered from bronchitis, by coughing and straining partially ruptured abdominal incision and forced out a knuckle of intestine. This was replaced. Mother made good recovery. Child was born living, but died some days later of marasmus.

CASE 6. Primipara. Central placenta prævia at seven and one-half months. Profuse hæmorrhage. No dilatation. Classic section, with gauze packing. Mother recovered. Child lived thirty-six hours.

CASE 7. Multipara. Central placenta prævia. One profuse hæmorrhage. Mother and child in fair condition. Classic section with gauze packing. Mother and child recovered, the mother nursing her child.

This patient subsequently became pregnant and entered the Maternity, where she gave birth to a living, healthy child in spontaneous labor.

In these cases the original Porro operation was chosen where there was good reason to fear that the patient was already infected from surrounding filth or previous manipulation. Where it was thought that the uterus could be saved the classic section was done, followed by cleansing of the uterus with normal salt solution and packing with ten per cent iodoform gauze.

The consensus of opinion among those of large experience is now against the employment of the vaginal tampon of gauze in central placenta prævia. Experience shows that this does not efficiently control hæmorrhage, that it inevitably results in further separation of the placenta, and that it often is accompanied by infection.

A case recently admitted to the Maternity was operated upon in my absence by my assistant. The patient, a multipara, had had severe hæmorrhage in her lodging. A vaginal tampon of iodoform gauze had been applied by her attending physician. She was brought to the Maternity and delivered by abdominal Cæsarean section. The child survived in good condition, and the mother died on the sixth day.

At autopsy, the abdominal wound was clean and healing; the uterine cavity was sterile; the uterine wound sterile and healing. General peritonitis was present with an accumulation of turbid serum beneath the liver and in Douglas's cul-de-sac. Cultures showed the presence of streptococci, staphylococci and bacillus coli communis.

The intestinal tract was searched for the cause of infection, but the appendix was normal and there was no evidence of infection from that source. The gall-bladder was normal.

The most rational explanation of the peritonitis in this case was infection by packing at the cervix, the infective germ entering at that point.

An extensive survey of the literature of central placenta prævia is unnecessary in the presence of those who are familiar with obstetric writings. The following papers during the past few years have been of especial interest:

Lefebre[1] believes that section is indicated in selected cases of placenta prævia with undilated cervix, with mother and child in good condition. The use of the tampon should be avoided, and if the child is feeble or dying, it should be used by the Braxton-Hicks method as a plug to prevent hæmorrhage. If circumstances are favorable for dilating the cervix, and the child living and in good condition, the intraovular use of the dilating bag is advised.

Scipiades reports from the clinic at Budapest[2] two successful cases of section for central placenta prævia. In the second, the uterus was found to contain fibroid tumors, and hysterectomy was performed. Both mothers and children recovered.

Schweitzer[3] from Zweifel's clinic at Leipsic, reports a successful subperitoneal section for central placenta prævia, with the recovery of mother and child. Where the patient is uninfected, and the mother and child in good condition, and the cervix undilated, he believes this treatment advisable.

Sigwart[4] reports from the Charité, Berlin, a trial of the use of Momburg's bandage to control hæmorrhage in central placenta prævia, followed by delivery by vaginal section.

This treatment is obviously possible in the hands of experts and in the hospital. He states that Bumm, Döderlein, Krönig and Sellheim have abandoned this method, preferring the intraovular use of the dilating bag in appropriate cases, and, in a small number, delivery by abdominal Cæsarean section.

Olow[5] writes from Essen-Möller's clinic at Lund, that in central placenta prævia, with mother and child in good condition, delivery by abdominal Cæsarean section is indicated.

Gussakow[6], from the Imperial Hospital in St. Petersburg, advises abdominal Cæsarean section in central placenta prævia if mother and child are in good condition and the life of the child is greatly desired.

Weischer,[7] from Olshausen's clinic in Berlin, would limit the intraovular use of the dilating bag to cases where mother and child are in good condition and the cervix sufficiently softened to permit safe dilatation. He draws attention to the good results obtained by version, where the life of the child may be disregarded. In a small number of cases section is permissible.

Döderlein,[8] from the Munich clinic, discusses the merits of vaginal section in placenta prævia. He believes that future experience must decide between the different forms of section, the intraovular use of the dilating bag, and the performance of version.

Hauch,[9] from Myers clinic in Copenhagen, reports a successful extraperitoneal section for central placenta prævia. He quotes Sellheim's success in saving eight mothers and eight children by this operation. He believes that extraperitoneal section is indicated in uninfected cases only with mother and child in good condition.

Kupferberg.[10] from the clinic at Mainz, calls attention to the value of Cæsarean section in checking hæmorrhage in placenta prævia. The character of the case must determine the choice of the ordinary section, —hysterectomy, or total extirpation of the uterus.

The advisability of Cæsarean section in

[1] Inaugural dissertation, Rostock, 1910.
[2] Zentralblatt f. Gynäkologie, No. 41, 1911.
[3] Archiv f. Gynäkologie, Band 94, Heft 3, 1911.
[4] Zentralblatt f. Gynäkologie, No. 28, 1910.
[5] Zentralblatt f. Gynäkologie, No. 13, 1910.
[6] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 32, Heft 3, 1910.
[7] Zeitschrift f. Geburtshülfe und Gynäkologie, Band 67, Heft 2, 1910.
[8] Archiv f. Gynäkologie, Band 92, Heft 1, 1910.
[9] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 31, Heft 5, 1910.
[10] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 31, Heft 5, 1910.

central placenta prævia is admitted by the majority of obstetricians in selected cases. This treatment is applicable in hospitals only, and in the hands of experienced operators; but under favorable conditions it saves the lives of the mother and the child. Further experience is needed to enable us to form a permanent judgment concerning the indications for this operation and the range of its application. In the present state of our knowledge a small number of cases may add something of value to the sum of experience, and this is my excuse for reporting my personal experience.

HYPERNEPHROMA OF THE KIDNEY[1]

Report of Three Cases

By I. S. STONE, M. D., Washington, D. C.

THESE tumors are defined by Dr. Keen as "arising from adrenal tissue," whether in the normally situated gland or in ectopic fragments of the organ known as "adrenal rests." As already announced by many authors, Grawitz (1884) and Birch Hirschfeld (1896) made the original studies which demonstrated the origin and character of these tumors, and opened the way to a clear distinction between them and carcinoma, sarcoma, etc.

Von Bergmann says the hypernephromata are characterized as follows: "A nodular tumor of yellowish or brownish color with a harder center and a softer periphery which either presses aside the neighboring tissue or infiltrates it, and destroys it by the formation of new nodules. The mass of the tumor is made up of connective tissue stroma, whose meshes are filled by cubical or polygonal cells containing fat and glycogen. In the older portion of the tumor there may be cysts of degeneration and hæmorrhagic areas."

Blackburn,[2] I. W., says: "We have in hypernephroma a potentially malignant tumor derived from aberrant or normal adrenal epithelium, which is of mesoblastic derivation and which cannot be classed with either of the two great classes of malignant growths, carcinomata or sarcomata; although at present we have to acknowledge that carcinoma may be derived from all three layers of the blastoderm, yet this tumor differs in important details from the carcinomata, and the resemblance to ordinary sarcomata is still more remote."

The discovery of "adrenal rests" in the kidney, and the possibility of their location elsewhere in the body, has opened up a wide field for speculation and research. The literature is already very extensive. Keen collected 163 cases from 1890 until the time of his paper in 1904. More than thirty papers upon this subject have appeared since 1909, when Terrell published his paper and gave a review of the literature.

It is said that more men than women have hypernephroma. Of course, there is no explanation for this. Fowler has pointed out their rarity as compared to malignant tumors elsewhere, but that they are the most frequent of all malignant tumors of the kidney. One has only to reflect a moment to confirm Fowler's remark that while carcinomata, sarcomata and other neoplasms of the kidney are diminishing in number, the hypernephromata are relatively increasing.

Symptoms. Although hypernephromata are nearly always malignant in character, it is rather exceptional that blood is seen in the urine. This is explained by some as due to the growth of the tumor from adrenal rests in the kidney nearest to the adrenals or in the upper part and away from the pelvis of the organ. In certain instances hæmorrhage has been found due to encroachment upon or into the pelvis of the kidney by the new

[2] W. M. Ann., 1910–11. 9, p. 177. "Hypernephroma of the Kidney."

[1] Read before the Washington Surgical Society, March 15, 1912. (See discussion, p. 753.)

growth. It is quite possible that prolonged search would reveal blood cells in the urine when the quantity was too small to be observed by the patient. Ureteral catheterization has not given much information if one may rely upon reports found in the literature.

Pain is always experienced in or near the kidney and often at some distance, as noted by Mayo Robson, who has seen it most severe in the shoulder. In one of our cases it was most severe perhaps three inches below the kidney.[1] Certain reports show that pain is occasionally due to the passage of blood clots or casts of the pelvis or ureter. These tumors are rarely palpable and percussion shows only an increased dullness if the growth has attained considerable size. The patient presents a clinical picture of marked anæmia or of some constitutional disease. There is often a rise of temperature with sweats and other manifestations of mild infection. There is a slight leucocytosis, rarely over 12,000, and, of course, with low hæmoglobin. In many instances a high blood pressure has been noted with a diminution of red cells in most cases, but in some they are relatively high. The skin is rarely pigmented, being in this respect strongly in contrast with tuberculosis of suprarenal capsules.

Several authors have mentioned varicocele as a complication, which was not present in two of our cases who were males.

Finally, metastases are common and most frequently seen in the lungs, liver, bones, and in or near the line of incision.

Albrecht studied twenty-four cases, of which eight died under operation; four remained well after three years. One of these had a later recurrence in the occipital bone; a second in the scapula; and a third in the spine, as late as seven years after operation. Only one of Albrecht's cases remained well after four years. Wilson, L. B., however, shows a better and more hopeful outlook. Of thirty-two hypernephromata (1901–1909), only 10 had died as far as known, 20 were alive, but 12 had been operated upon less than one year.[2]

[1] In one of our cases the pain was most severe in the region of the opposite kidney.

[2] Old Dom. J. M. S., Richmond, 1910, x, 237, 252, 12 pl.

CASE 1. Mr. R., white, age 40, was referred by Dr. Settle of Virginia, in 1900. The patient was very anæmic but had no cachexia. He had severe pain in the region of the right kidney, had never seen blood in his urine and had a large tumor which had been diagnosed a carcinoma by his physician. The tumor was somewhat crushed during its removal but there were no complications during or succeeding the operation. Dr. Carroll pronounced the growth a "peculiar mixed malignant growth with embryonic elements." The rarity of a microscopic diagnosis at that time undoubtedly prevented the pathologist from giving the true name. In less than two years, this patient had enlarged glands in his right breast and we naturally thought a recurrence was at hand. However, this proved incorrect and the patient lived more than six years in good health and finally died of malarial fever.

CASE 2. Mrs. W., white, age 53. Operation Columbia Hospital, November 19, 1906. The patient was a tall, thin woman who had been in poor health for several years and had lost forty pounds in weight. She had been suffering from pain in the region of both kidneys for two years or more, with more pain in the left than in the right side. The right kidney was found greatly enlarged and she came to the city to arrange for the operation as suggested by her family physician. She had marked anæmia, hæmoglobin 60; leucocytes 10,000; reds 3,500,000; heart and lungs normal; no history of liver or gall-bladder disease. There was no history of any constitutional disease such as syphilis or tuberculosis, although she had experienced many attacks of bronchitis.

One year previous to admission she had known of a tumor in region of her right kidney which could be seen to distend the abdomen in the upper right quadrant. The tumor was not freely movable and we thought it an enlarged kidney with probable cystic degeneration. Her urine had never been bloody. On examination of segregated urine before operation a few pus cells were found, but no red cells from either kidney. Sp. gr. 1,022; urea gr. x to oz.

The skiagraphs gave us no information of value, save to show nothing like stones in either kidney. The history of persistent pain caused us to explore the left kidney, which was done, and its ureter was catheterized without result. We then stripped off the fibrous capsule from two thirds of the kidney and closed the wound. We next did a nephrectomy on the right side, which was accomplished without unusual difficulty save for the large size of the tumor, which was nearly as large as that in the first case reported.

The patient made an uneventful recovery from the operation. Her urine was scanty during the first 24 hours, 7 oz.; second day, 27 oz.; third day, 50 oz.; fourth day 47 oz.; sp. gr. low; urea gr. v. to oz. For a few days a little blood was found in the urine which soon disappeared.

Patient made a remarkably good recovery from operation and gained nearly thirty pounds in weight,

but had a recurrence in the outer margin of the incision in less than a year after operation, and soon after this her uterus, and later her bladder, were involved and caused her death about one year after the recurrence was first observed.

CASE 3. Mr. D., white, age 53. Referred by Dr. Frost of Virginia. The patient was a thin, pale man, who had been ill for more than three years. He had an attack of diarrhœa when illness first began. A few bloody stools were seen about that time, but no blood had been seen in his urine at any time, nor had anyone suspected a renal cause for the patient's ill health. Every symptom had reference to the digestive organs. The patient had suffered pain at a point about three inches below the normal position of the kidney. Morphia had been prescribed by his physician to afford rest from pain and to enable him to sleep. His appetite and digestion had not been greatly disturbed by the morphia, although he was somewhat constipated from its use. He declared that pain came on regularly after eating a fairly hearty meal. There had been no marked nausea, nor had he vomited at any time. There was no history of varicocele, or any symptom referable to genito-urinary organs. His hæmoglobin was low, 55; red cells 3,000,000, and leucocytes 9,000. Blood pressure not taken. Skiagraph shows nothing in region of kidney, stomach or transverse colon to account for the pain experienced by the patient. The diagnosis could not be made with certainty, but we were strongly of the opinion that a perforation had occurred between stomach and transverse colon, or else between the jejunum and transverse colon. That the colon was involved proved correct, but not as suspected.

Operation at Georgetown University Hospital, December, 1911. Nephrectomy. The abdomen was first explored by median incision, when it was shown that the splenic flexure of the colon was firmly adherent to the peritoneal capsule of the kidney. The incision was closed and the kidney removed by the loin.

There was nothing unusual about the operation nor was the recovery attended by any complication. The patient returned to his home in the country in three weeks after operation and is still well.

MYOMA OF THE CERVIX UTERI

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IT is estimated that ten per cent of white women and thirty per cent of colored women have uterine myomata. Cervical myoma is much rarer in occurrence. The average, obtained from a computation of the appended tables, is only 3.3 per cent.

Löhlein (1), in 350 cases of uterine myoma, found 14 cervical.....4 %
Schröder (2), in 370 cases of uterine myoma, found 27 cervical.....8.1%
Sims (3), in 119 cases of uterine myoma, found 2 cervical.....1.7%
Amann (4), in 500 cases of uterine myoma, found 0 cervical.....0 %
Schorler (5), in 334 cases of uterine myoma, found 27 cervical.....8.8%
Bigelow (6), in 573 cases of uterine myoma, found 2 cervical.....0.35%

The rarity of this lesion, the functional disturbances it creates in the uterus as well as in the neighboring viscera, the difficulties it frequently offers in the making of a correct diagnosis, and the hesitancy that arises in the mind of the surgeon as to which procedure to adopt in its treatment — all these facts make the undertaking of our present study worth our while.

We will consider this subject under the following headings:

I. The report of a case of a true cervical myoma.

II. The definition and classification of cervical myoma.

III. A consideration of the pathology and the etiology of cervical myoma.

IV. The relation of cervical myoma to conception, pregnancy and labor.

V. Treatment.

VI. A tabulation of the cases of cervical myoma recorded in the literature since 1885.

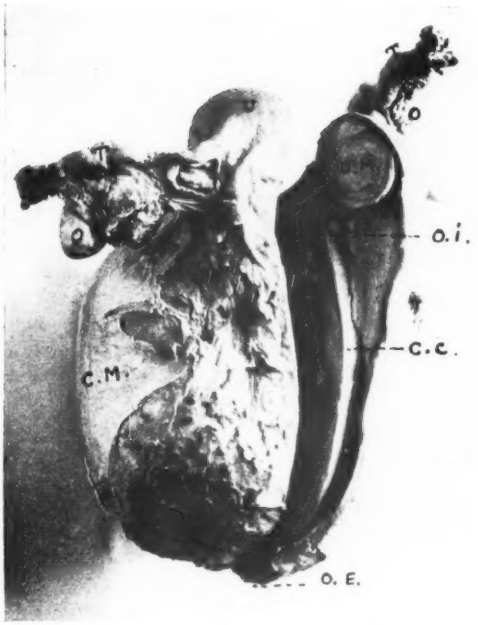
I. REPORT OF A CASE

B. C., age 39, married, para three, last child six years ago. No miscarriages and no abortions. Menstruation began at 16, four-weekly in type, moderate in amount, and painless. Her labors and puerperiums were normal. Last menstruation was on February 10, 1911. Present history: For the past six years her menstruation is irregular and painful. Two years ago she began to suffer in addition from pains in the lower abdomen, most marked in the right iliac region, and from attacks of metrorrhagia. Lately she has also been complaining of a sensation of weight in the pelvis and of difficult and frequent micturition, increasing constipation and headaches. All of the above symptoms are gradually increasing in severity.

On February 28, 1911, she entered the Beth Israel Hospital. Examination showed the patient to be of medium height, well nourished, complexion fair, temperature 99.2°, pulse 100, respiration 22, hæmoglobin 84 per cent, lungs negative, heart somewhat irregular in action, but no murmurs were audible. *Abdominally:* A hard globular, slightly movable tumor is felt occupying the hypogastric, the left iliac, and part of the right iliac regions. The upper limits of the tumor are on a level about two inches below the umbilicus. At the right upper pole of this tumor a hard knob-like projection, the size of a lemon, is distinctly felt. *Vaginally:* This tumor almost fills the entire true pelvis. The only part of the cervix that is palpable is the external os, in the form of a thinned-out ring, admitting the tip of the index finger. The rest of it merges into the tumor mass. The sensation imparted to the palpating finger closely simulated the one obtained when examining a full-term pregnancy with a cephalic presentation at the end of the first stage of labor. A diagnosis of uterine myomata was made.

On March 6, 1911, the writer performed an abdominal panhysterectomy. On entering the peritoneal cavity, through a median incision the tumor readily presented, and, on a more thorough examination, it proved to be a large interstitial cervical myoma of the posterior wall, with the uterus perched on its upper right corner. The disturbances in the anatomical relations encountered during the operation were a change in the course of the uterine arteries from a transverse to a perpendicular one, and a flattening of the vesico-uterine fold and an almost complete obliteration of Douglas' cul-de-sac. The patient made an uneventful recovery and left the hospital on the eighteenth day after the operation.

Macroscopic and microscopic examination of the tumor. The tumor is a fibromyoma of the posterior cervical wall, interstitial in character and supravaginal in location. It measures 11.8x10x11.8 cm., and is surrounded by a distinct capsule made up of cervical wall in a greatly attenuated state. The cervical canal measures 11.4 cm. in length and is very narrow. The uterus is situated at the upper



U.—Uterus. T.—Fallopian tube. O.—Ovary. C. M.—Cervical myoma. U. M.—Uterine myoma. C. C.—Cervical canal. O. I.—Os internum. O. E.—Os externum.

part of the tumor. It is slightly enlarged and contains an interstitial myoma, the size of a walnut at the fundus. The tubes and ovaries presented no deviations from the normal. Microscopic examination: The cervical wall is very thin throughout its entire length and consists, for the most part, of a fibrous tissue capsule with very few muscle cells. The mucosa is reduced to a flat layer of epithelial cells, and the glands have entirely disappeared. Only in the region near the internal os uteri do the cervical glands begin to reappear and assume their normal structure. Sections from the uterine body offered nothing abnormal for study.

II. A DEFINITION AND CLASSIFICATION OF CERVICAL MYOMA

Volumes have been written upon the subject of uterine myomata, and while cervical myomata are of an equally great clinical importance, yet most text-books omit to mention it altogether, and the information regarding this pathological entity that is furnished by some is very meager and unsatisfactory.

A cervical myoma is one that originates within the area bounded by the internal and the external os uteri. The starting point may be the anterior wall, the posterior wall or the lateral wall, or a combination of either two or three of these points.

In 114 cases selected from the appended tables, where the location of the myoma is distinctly stated, we find:

Cervical myoma of the anterior lip	45 cases
Cervical myoma of the posterior lip	55 cases
Cervical myoma in the right or in the left half of the cervix	14 cases

These figures tend to show that the affection is almost as frequent in the anterior wall as in the posterior wall of the cervix. Other authorities differ on this point and claim that the ratio between anterior and posterior cervical myoma is as 1 : 2. In the course of its development a cervical myoma may, like the uterine myoma, become *submucous*, *interstitial*, or *subperitoneal*. In its relation to the pelvic cavity, or the genital tract, cervical myomata have been classified by Haultin (7) into three groups:

A. Supravaginal: Those situated above the insertion of the posterior vaginal wall.

B. Intervaginal: Those occupying the space between the insertions of the posterior and the anterior vaginal walls.

C. Intravaginal: Those tumors growing below the attachment of the anterior vaginal wall.

For more practical purposes a simpler classification into *supravaginal* and *intravaginal* will suffice. The former to designate all those tumors that are not entirely palpable per vaginam, the latter all those that can be felt immediately within the cervical canal or within the vagina.

III. A CONSIDERATION OF THE PATHOLOGY AND ETIOLOGY OF CERVICAL MYOMA

The time-honored nomenclature of myoma (fibroid, fibromyoma and myofibroma) has of late undergone a radical change. In the light of the investigation by Mallory (8) we classify all these tumors under one heading of myoma. His studies have proven that the growth of these tumors depends upon the proliferation and hyperplasia of the muscle cells, the fibroid element serving only as a

supporting structure. The consistency of these tumors, therefore, will vary not according to the difference in the relation of growth between the muscle cells and the connective tissue cells, but as to whether the former element is in an active or in a passive state. Thus a soft and growing tumor indicates muscle cell proliferation; a hard and shrinking tumor muscle cell atrophy.

Pathologically, cervical myoma differs from corporeal myoma only by its greater tendency towards encapsulation and that it sends offshoots into the surrounding structures more frequently.

Having established a satisfactory clinical and pathological definition of cervical myoma, the next question that deserves consideration is, wherefrom do these tumors originate?

Before entering into a discussion of the various theories and hypotheses offered by different investigators, it is essential that we review a few facts concerning the *embryology of the uterus*.

The uterine parenchyma is developed from the mesodermal layer of the genital strand, which is a mass of multinuclear connective tissue cells, with the Müllerian epithelial threads growing into it. In the process of tissue differentiation the muscle bundles develop from the central portion of this strand, and its innermost part becomes the mucous membrane, retaining with but slight changes its connective tissue characteristics, and the fibrilar connective tissue is derived from those embryonal rests that become enclosed in the interstices of the muscle bundles and which have lost their multinucleated appearance.

Since the mucosa, the muscularis and the connective tissue framework of the uterus have a common embryological origin, it is possible for the least differentiated of these tissue elements, under certain conditions, to evolve into a more highly specialized structure. These phenomena have been repeatedly observed in the adult uterus.

Canheim (9) describes the development of myomata as follows: "The germ cells that remain quiescent during the embryonal development of the uterus, and which respond to a physiological stimulus during pregnancy, to cause an hypertrophy of that organ; that under pathological conditions the activity of those same cells will result in an atypical development with the formation of a myoma."

Agreeing upon the embryonal theory of tumor formation, investigators differ as to the starting point of the myomata, and as to the cause that calls forth this tissue metamorphosis and proliferation; for masses of young connective tissue are found in the adult uterus under various conditions.

Roesger (10) and Kleinwachter (11) in examining young myomata found the young connective tissue grouped around the small blood-vessels, which were void of their adventitia; they, therefore, concluded that the *outer coat of the small blood-vessels* is the main contributing factor in the origin of myoma formation.

Virchow (12), Gusserow (13) and Opitz (14) found embryonal tissue in the walls of pregnant uteri, and in the walls of those that were the seat of chronic inflammation. Pregnancy and inflammation are both causing a hyperæmia of the organs affected.

Gottschalk (15), Engelmann (16), Olshausen (17) and Röhrig (18) have, therefore, taught that a uterus which is subject to repeated active, or passive, hyperæmia forms a favorable nidus for the development of a myoma. These facts have also caused Virchow to propound his *irritation theory* as a cause of tumor growth.

Ribbert (19) claims that myomata are not the result of prolonged hyperæmia of the uterus but are due to a displacement of tissue elements which he names "Die Absprengung von Keimen," and this phenomenon is most frequently observed during pregnancy.

Ricket (20) and Sames (21) have claimed that the heterologous tissue phenomenon observed in the uterus was not an acquired one through pregnancy or inflammatory changes, but that it was a *congenital condition*.

In comparing the relation of the mucosa to the muscularis in the uterus of the newborn and of the adult we are at once struck with the existing difference. In the adult, we find the mucosa sinking into the muscularis in some places only, and for a very short distance; in the newborn, the mucosa proliferates in

broad strips between the muscle bundles to so great a depth that at times it almost reaches the serosa. In the event of faulty development with a persistence of fœtal rests of mucosa, a nidus is formed for the development of myoma or adenomyoma.

Recklinghausen (22) is of the opinion that all *myomata originate from the same germ cells as the adenomyomata*, only that in most myomata the epithelial element is lost.

Out of this mass of theoretical pabulum, proffered for the solution of the origin and cause of uterine myoma, only a single kernel has been selected by most authorities, and that is the theory of Conheim.

If, however, we search the literature for the cause that is capable of reawakening this dormant, congenital or acquired heterologous tissue into renewed cell activity with the development of myomata, then we find ourselves delving into a labyrinth of intricacies that defy analysis. Virchow's irritation theory, when applied to cervical myoma, is clinically disproven. The portio is exposed to more irritation and traumatism incident to labor and infection than the corpus uteri, and yet cervical myoma is a rarity when compared to corporeal myoma. Taking for example the theory that pregnancy, abortion and other factors leading to hyperæmia of the body of the uterus are the irritants that cause the development of myoma, we at once face two sets of observers whose views are diametrically opposed to each other. In a study of the proportion of married to unmarried women suffering from cervical myoma we find:

Winkel (23), giving a ratio of 3:1.

Engelmann (ibid.), giving a ratio of 5.1:1.

Frank (24), giving a ratio of 5.6:1.

In controversion to these statistics we may quote the teachings of E. Möller (25) and Bayle (26), who state that virginity, celibacy and sterility are most favorable predisposing factors to the growth of myomata.

The theory of *chronic inflammation* the result of pathogenic micro-organism as a cause of myoma can neither be accepted, for we still have no microscopic proof of what constitutes a pathological evidence of this condition. Round cell infiltration, mast cells and young connective tissue are phenomena observed in physiological states such as pregnancy.

The other causes enumerated, such as heredity, psychic disturbances, abnormal or excessive coitus, etc., seldom bear a clinical test and are, therefore, of but little significance.

Shall we then conclude, with Gusserow (ibid.), who said, "Über die Ursachen der Uterusmyome wissen wir so wenig wie über die Ursachen der meisten pathologischen Neibildungen, nämlich nichts," or shall we turn our attention to new sources for light and information?

Recent studies on the internal secretion of the ovary, while still in the process of crystallization, hold out new hope. Clinically, this theory is adequately supported. An analysis of statistics, giving the age at which myomata are most frequently found, furnishes satisfactory data.

Schorler (ibid.) tabulated 324 cases and found:

Up to the 30th year, 29 cases of uterine myoma, but no cervical.
30–40th year, 90 cases of uterine myoma and 8 cervical.
40–50th year, 171 cases of uterine myoma and 11 cervical.
50–60th year, 31 cases of uterine myoma and 6 cervical.
60–70th year, 3 cases of uterine myoma and 0 cervical.

Frank (ibid.) found, up to the 20th year, 3 cases of cervix myoma.

20–30 years, 4 cases of cervix myoma.
30–40 years, 27 cases of cervix myoma.
40–50 years, 25 cases of cervix myoma.
60 years, 1 case of cervix myoma.

Johnson (27) found, before the 20th year, 1 case of cervix myoma.

20–30 years, 10 cases of cervix myoma.
30–40 years, 23 cases of cervix myoma.
40–50 years, 8 cases of cervix myoma.
50 years, 1 case of cervix myoma.

In 115 cases included in this report, where the age is stated, we find:

Up to the age of 20, two cases of cervical myoma.
20–30 years, 27 cases of cervical myoma.
30–40 years, 35 cases of cervical myoma.
40–50 years, 50 cases of cervical myoma.
50–60 years, 19 cases of cervical myoma.

The fact gleaned from these statistics is, that the period of life at which myomata, both corporeal and cervical, are most prone to develop is between the ages of 30 and 45 —a period during which the sexual functions are still at the height of their activity.

Under normal physiological conditions, during this period the ovarian secretion or the ovarian hormone exercises its strongest influence upon the functions of the reproductive organs, which is manifested by the phenomena of menstruation, fecundation and pregnancy. And, just as these functions are normally under the control of a secretion generated in the sexual gland, why is it not possible that myomata are the result of a disturbed ovarian function leading to the production of a new hormone, termed by Seitz (28) a myomhormone?

Why should a multipara, after having borne, in some instances, as many as eight or more children, all of a sudden cease to be fertile while her menstrual function is still active, and, after a prolonged period of relative sterility, find herself to be the victim of a corporeal or cervical myoma? In the 59 cases of multiparæ gathered from our tables, the interval between the last childbirth and the time when the cervical myoma has reached sufficient dimensions to cause the patient to seek medical aid varied from one to 21 years.

Are we not justified to maintain the supposition that during this period of sterility some disturbance has occurred in the sexual activities whereby these energies have been diverted from their normal course and have assumed a pathological rôle?

The same reasoning may be applied with equal certainty to the cases of cervical myomata met with in the celibate or the primarily sterile woman. Here the pent-up sexual powers find expression, not in fecundation and reproduction, but in the generation of a tumor-forming hormone. Whether this myomhormone is solely of ovarian origin or a synthetic product of the collateral ductless glands, such as the thyroid and pituitary body, is still uncertain. Biopathology will, undoubtedly, in the very near future cast new light upon these dark and mooted problems.

IV. THE RELATION OF CERVICAL MYOMA TO CONCEPTION, PREGNANCY AND LABOR

Cervical myoma forms a distinct mechanical and pathological hindrance to conception. Sterility under these conditions is, therefore, quite common, but not as frequent as we would expect it to be.

Schorler (ibid.) found that out of 18 cases of cervix myoma only three, or 16.7 per cent, were sterile.

Frank (ibid.) found that out of 62 married women affected with cervix myoma only four, or 6.4 per cent, were sterile.

Our report shows that out of 108 cases of cervical myoma in married women, 29, or 26.9 per cent, were sterile; 7, or 6.5 per cent, had relative sterility, i. e., they have borne but once; 13, or 12.4 per cent aborted; 59, or 54.6 per cent, were multiparæ.

Having conceived, the pregnancy will continue up to term with greater certainty and assurance in a patient the subject of cervix myoma than in one who suffers from uterine myoma. Abortion occurs in greater preponderance in corporeal than in cervical myoma, for the cervix, being poor in muscular tissue, but seldom exhibits such contractile and expulsive powers as the uterus to dislodge a tumor growing within the walls or protruding into its lumen.

Absolute and relative sterility the result of cervical myoma does not form so important a clinical condition, owing to its effect on so few individuals. The grave and serious complications, on the other hand, that occur during pregnancy, labor and puerperium in conditions of cervical myoma, demand an all-absorbing consideration.

During pregnancy, symptoms of pressure upon the bladder and the rectum, varying from the mildest to the severest forms, will occur, and these symptoms will become more and more aggravated as pregnancy advances, owing to the increase in the size of the tumor, which participates in the general tissue hypertrophy. The degree of the severity of these symptoms will vary according to the location, of the tumor, more pronounced in the supravaginal variety and less marked in the intravaginal type.

During labor, if the growth is intravaginal

in location, then we meet with an obstruction in the lowermost portion of the parturient canal, which prevents the exit of a normally presenting fœtus. Should the tumor occupy a supravaginal position partly or completely filling the true pelvis, then malposition and malpresentation are the inevitable results. Methods adopted for the correction of these conditions under different circumstances, such as version or forceps, are fraught with far greater risk and disaster when applied here. Rupture of the uterus, puerperal sepsis as a result of the necrosis of the tumor, which has been exposed to pressure, death of the fœtus, and probably also of the mother, are some of the dire results of cervical myoma complicating labor.

V. TREATMENT

The treatment of cervical myoma is radical removal. For, besides the baneful influence it exerts upon pregnancy and labor, cervical myoma is subject, like all other benign growths, to serious forms of degeneration that may in itself constitute a menace to the well-being and the life of the patient.

Having established the diagnosis, the next question that will present itself for our solution is, how to remove it. The method of procedure to be adopted will depend chiefly upon its location. Most surgeons have agreed that the vaginal route is applicable for all intravaginal growths, may they be pedunculated or sessile in form. For the supravaginal variety, the abdominal approach gives the most satisfactory results. Pregnancy and labor shall never form indications for expectant therapeutic methods, unless the size of the tumor is of such dimensions that we may safely predict no untoward complications from its presence. Small cervical myomata are known to have disappeared after labor. The supravaginal myomata, especially the anterior variety, offer the greatest surgical difficulties, for they distort the anatomical relations of the bladder and the ureters and thereby expose them to operative injuries. The intravaginal tumors offer the least difficulties in their removal. If of extraordinary size, so that it cannot be delivered from the vagina by traction, morcellation may be resorted to, until the pedicle or base is reached, which is treated accordingly. If sessile in form and intracervical in location, anterior or posterior hysterotomy will greatly facilitate its removal.

In the case of supravaginal cervical myoma, shall a hysterectomy or a myomectomy be performed? In the hands of the average surgeon hysterectomy is the safest procedure, unless the myoma is distinctly subserous in character. Remembering that all supravaginal myomata are more or less interstitial and that the cervical myomata as a rule are more intimately connected with their surrounding tissue than the uterine, the cervical canal will of necessity be encroached upon with a resulting operative deformity. This distortion of the lumen may interfere with menstrual function, it may favor the abnormal implantation of the placenta, and towards the end of pregnancy hinder the proper dilatation of cervix and so expose the patient to dystocia and probable uterine rupture. Wm. J. Mayo (29) described a rather unique method in which the myoma with the "entire cervical canal from a point just below the internal os to a point slightly above the vagina" was removed; then he sutured this widely separated fundus to the vaginal remnant of the cervical canal with catgut sutures, and secured a perfect result. The patient menstruated regularly and without pain.

This operation, while it serves to demonstrate a highly developed surgical technique on the part of the operator, does not, to my mind, suggest itself as applicable to women in whom a possibility of future pregnancy does exist. We know that some risk of uterine rupture accompanies a pregnancy in a uterus, the seat of a scar from a previous Cæsarean section. This risk is undoubtedly enhanced when such a scar involves the entire circumference of the uterus in its most fixed, most fibrous, and therefore least dilatable, portion, namely, the isthmus or the portio. The utility of this operation should, therefore, be limited, and is to be applied in a few selected cases.

The credit for this unique operation belongs to Olshausen (30), who performed it with good result in 1901.

VI. A TABULATION OF THE CASES OF CERVICAL MYOMA RECORDED IN THE LITERATURE SINCE 1885

In 1885 Johnson (27) published "A Review of Some Collected Cases of Fibromyoma of the Cervix Uteri." Since then no other statistical report has appeared in the American literature. To make our present work comprehensive, from a clinical viewpoint, it is necessary to study a large group of cases. The writer has, therefore, collected 133 cases of cervical myoma, representing most of the available material recorded in the literature for the past twenty-six years. An analysis of the material thus gathered leads to the following clinical deductions:

1. The etiology of cervical as well as of corporeal myoma is, in all probability, a perverted ovarian secretion, which may be termed a "myomhormone." This is evidenced by the fact that it occurs either in multiparæ becoming relatively sterile, or in the primarily sterile, or in the celibates, in all of whom the sexual energy, while still active, apparently finds an abnormal expression in the tumor development.

2. The period of life most propitious for the growth of myomata is between the ages of 30 and 45. During this period procreation is usually on its downward course, but the other sexual manifestations, such as libido and menstruation, are still fairly active. This disturbance, in the relative proportion of the sexual gland functions, indicates a change in its metabolism, which suppresses fecundation, but is capable of calling forth a homologous or a heterologous tissue change and the formation of a tumor.

3. Cervical myomata affect the posterior lip more frequently than the anterior lip.

4. Cervical myoma is more often the cause of sterility than corporeal myoma.

5. Abortion occurs less frequently in cervical myoma than in myoma of the body of the uterus.

6. Dystocia is much graver and the results more serious in cervical myoma than in uterine myoma.

7. Bladder and rectal disturbances, and neuralgic pains from pressure upon the sacral plexus, manifest themselves at an earlier period in cases of the cervical myoma than in the uterine.

8. The diagnosis of cervical myoma offers greater difficulties than are presented by uterine myoma.

9. The treatment of cervical myoma is radical removal, choosing the vaginal route for the intravaginal variety and the abdominal approach for the supravaginal growths.

TABULATION OF CASES OF CERVICAL MYOMA RECORDED IN THE LITERATURE SINCE 1885.

1. KELLY, H. A. (Am. J. Obst., xix, p. 44, 1886). Age 40, began to menstruate at 20, always painful. Para two, the second was a premature birth, instrumental delivery. No abortion. *Chief symptoms:* Metrorrhagia for two years, accompanied by pelvic pains and urinary disturbances. *Diagnosis:* Cervical myoma, involving the anterior and the posterior lips, supravaginal in location, and subperitoneal in character. *Operation:* Abdominal hysterectomy. Recovery.

2. TILLAUX (Annal de Gynec., Paris, p. 248, 1886). Age 19, single. *Chief symptoms:* Metrorrhagia since her thirteenth year. *Diagnosis:* Cervical myoma of the anterior lip, submucous in character and intravaginal in position. *Operation:* Vaginal amputation of anterior lip.

3. KYRI, H. (Wien. med. Presse, xxvii, p. 677, 1886) Age 38, has had four children; all labors were difficult. No miscarriage. *Chief symptoms:* For one year, irregular menstruation. *Diagnosis:* Cervical myoma of the anterior lip, submucous in character, supra- and intravaginal in location. *Operation:* Abdominal hysterectomy. Recovery.

4. JOUIN, F. (Bull. et mem. Soc. d'Obst. et d'gynec. de Paris, ii, p. 89, 1887). Single, multipara. *Chief symptoms:* For two years extreme hæmorrhages and expulsive pains. *Diagnosis:* Pediculated cervical myoma of the posterior lip, intravaginal in location and submucous in character. *Operation:* Vaginal myomectomy. Recovery.

5. HORROCKS, P. (Trans. Path. Soc. London, xxxviii, p. 249, 1887). *Diagnosis:* Cervical myoma of the posterior lip, supravaginal in location, and subperitoneal in character. The tumor was also intimately connected with the posterior uterine wall. *Operation:* Abdominally.

6. GALABIN, A. L. (Trans. Obst. Soc. London, xxxviii, p. 178, 1887). Age 17, no children, no abortions. *Chief symptoms:* For past six weeks is suffering from a serosanguinous vaginal discharge. *Diagnosis:* Cervical myoma, submucous in character and intravaginal in location. *Operation:* Removed vaginally. Recovery.

7. CHELMINSKI, A. F. (J. Akush. i. Jenski Boleiz, St. Petersburg, i, p. 917, 1887). Age 47, began to menstruate at 17, irregularly every six to eight weeks, profusely and painful. Has had four children, last one 21 years ago. *Chief symptoms:* For past ten years metrorrhagia, backache, abdominal pains, obstipation, disuria and retention. *Diagnosis:* Cervical myoma of the posterior lip, supravaginal in location and interstitial in character. *Operation:* Double oöphorectomy. Recovery.

8. SWIECICKI (Frauenarzt Berl. iii, p. 183, 1888). Age 36, began to menstruate at 14, regularly and moderate in amount. Married twelve years, has had six children, the last one six years ago. No abortions. *Chief symptoms:* For past six years, metrorrhagia. *Diagnosis:*

Cervical myoma of the posterior lip, intravaginal in location, interstitial and submucous in character. *Operation:* Vaginal myomectomy. Recovery.

9. AMANN (Münch. med. Wchnsch. xxxv, s. 890, 1888) Age 50, menstruation began at 18, scanty, painless and regular. Has had six children, last one ten years ago. No miscarriages. *Chief symptoms:* For past two years irregular bleeding, lately frequent micturition, headaches, loss of weight. *Diagnosis:* Cervical myoma of the right half, intravaginal in location and interstitial in character. *Operation:* Vaginal myomectomy. Recovery.

10. LUDLAM, R. (Clinique, Chic., x, p. 5, 1889). Age 52, menstruation always profuse and frequent, has had eight children, last one eleven years ago, four miscarriages. *Chief symptoms:* Eleven years ago she noticed a tumor protruding from vulva. During her last pregnancy this tumor did not hinder the delivery. Seven years ago she passed a polypoid growth. *Diagnosis:* Cervical myoma of the posterior lip, intravaginal in location and interstitial in character. *Operation:* Vaginal myomectomy. Recovery.

11. SINCLAIR, W. J. (Med. Chron. Month., xi, p. 283, 1889–90). Age 40, dysmenorrhœa, para one, eight years ago, one miscarriage six years ago. *Chief symptoms:* Five years ago began to suffer from leucorrhœa, bearing-down pains and bleeding, which is worse for the past six months. *Diagnosis:* Cervical myoma of the posterior lip, intravaginal in location, submucous in character.

12. SANGER (Zentralbl. f. Gyn., xiii, s. 207, 1889). Age 39. *Chief symptoms:* Tenesmus, ischuria and disuria. *Diagnosis:* Cervical myoma of the posterior lip, supravaginal in location and subperitoneal in character. *Operation:* Laparotomy, oöphorectomy. Improved, the tumor gradually diminished in size.

13. SANGER (ibid.). Age 35, no children, no abortions. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal myomectomy. Recovery.

14. SANGER (ibid.). Age 33, one premature birth. *Chief symptoms:* For past four months urinary disturbances. *Diagnosis:* Interstitial cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal hysteromyomectomy, vaginal drainage. Recovery.

15. FRANK, H. (Das Fibromyom des Collum Uteri. Inaug. Diss. Giessen, 1889). Age 42, menstruation normal, has had three children, last one three years ago. No miscarriages. *Chief symptoms:* For past eight months dysmenorrhœa and retention of urine. *Diagnosis:* An interstitial cervical myoma of the posterior lip, supravaginal in location. *Operation:* Vaginal myomectomy. Recovery.

16. FRANK, H. (ibid.). Age 45, para four, last child seven years ago. No miscarriages. Menopause set in one year ago. *Chief symptoms:* Since the onset of the menopause is suffering from leucorrhœa, lately retention of urine and prolapse. *Diagnosis:* A submucous cervical myoma of the anterior lip, situated supra- and intravaginally. *Operation:* Vaginal myomectomy. Recovery.

17. FRANK, H. (ibid.). Age 50, menstruation began at 17, regular. Para three, one miscarriage nine months ago. *Chief symptoms:* For past year irregular bleeding and leucorrhœa. *Diagnosis:* Submucous cervical myoma of the posterior lip, situated intravaginally. There was also a subserous cervical myoma projecting from the right cervical wall.

18. BOULTON, P. (Lancet, London, ii, p. 339. 1890). Age 36. *Chief symptoms:* For six months metrorrhagia and backache. *Diagnosis:* Interstitial cervical myoma of the posterior lip, located intravaginally. *Operation:* Vaginal myomectomy. Recovery.

19. KERN, J. W. C. (Inaug. Diss. Freiburg, 1890). Age 52, menstruation normal. Para fourteen, last child nine years ago. *Chief symptoms:* Four years ago began to suffer from pains in the right side of abdomen, two years ago prolapse, leucorrhœa, and metrorrhagia, lately disuria, anuria and anæmia. *Diagnosis:* Supravaginal cervical myoma of the posterior lip. *Operation:* abdominal panhysterectomy. Died.

20. RIEDINGER (Prag. med. Wchnsch. xvi, s. 186, 1891). Age 36, menstruation normal, last child one and a half years ago. No tumor was noticed during the last delivery. *Diagnosis:* Myoma of right cervical wall, interstitial in character and supravaginal in location. *Operation:* Vaginal myomectomy during labor. Died.

21. DSIRNE, J. (St. Petersburger med. Wchnsch. N. F. No. 8, s. 157, 1891). Age 51, menopause set in four years ago. Para five, last child eighteen years ago. No miscarriage. *Chief symptoms:* Since the onset of menopause, metrorrhagia. Lately urinary disturbances. Within the last six months a vaginal tumor has been noticed. *Diagnosis:* A submucous pedunculated cervical myoma of the posterior lip, situated intravaginally. *Operation:* Vaginal myomectomy. Recovery.

22. FRANK (Wien. med. Wchnsch. xlii, 1892). Age 34. Nullipara. *Diagnosis:* A right-sided supravaginal cervical myoma, complicating pregnancy. *Operation:* Abdominal myomectomy. Recovery.

23. FRANK (ibid.). Age 45, menstruation began at 16, regular profuse and painless. Para three, last one 17 years ago. No miscarriages. *Chief symptoms:* One year ago began to suffer from pressure pains in pelvis, obstipation and disuria. Lately offensive vaginal discharge. *Diagnosis:* Submucous cervical myoma of the posterior lip, located intravaginally. *Operation:* Vaginal myomectomy. Recovery.

24. FRANK (ibid). Age 41, para five, last one eleven years ago. No miscarriages. *Chief symptoms:* For past three months a sensation of a foreign body in the vagina, disuria and stranguria. *Diagnosis:* Interstitial cervical myoma of the anterior lip, intravaginal in location. *Operation:* Vaginal myomectomy. Recovery.

25. FRANK (ibid.). Age 41, menstruation began at 17, regular and moderate in amount. Para two, last child four years ago. No miscarriages. *Chief symptoms:* Menorrhagia for two months, constipation, no urinary disturbances. *Diagnosis:* Submucous cervical myoma of the posterior lip, intravaginally located. *Operation:* Vaginal myomectomy. One month later panhysterectomy, as the myoma showed carcinomatous changes. Recovery.

26. DIMMOCK, H. P. (Lancet, London, ii, p. 495, 1893). Menstruation was always painful and profuse. Nullipara. *Chief symptoms:* For past three years profuse leucorrhœa, weight in pelvis, pressure in rectum and difficult urination. *Diagnosis:* Submucous cervical myoma of the anterior lip, situated intravaginally.

27. FREUND, M. D. (V. Volkmann's Sam. klin. Vortr. N F. No. 68, s. 637, 1893). Age 38, menstruation normal. Para four, last child three years ago. No miscarriage. *Chief symptoms:* Patient was first seen during labor with her fifth pregnancy; since the second month of gestation is suffering from urinary disturbances. Went into labor five weeks ago and since then has passed portions of a macerated fœtus. *Diagnosis:* Intravaginal submucous cervical myoma of the anterior lip. The rest of the fœtus was finally expelled spontaneously. The tumor then diminished in size gradually. Recovery.

28. MOULLIN, J. A. M. (Brit. Gyn. J., x, p. 173, 1894–95). Age 50, nullipara. *Chief symptoms:* Is conscious of the presence of a tumor for the past five years.

Diagnosis: Intravaginal cervical myoma. *Operation:* Abdominal hysterectomy. Recovery.

29. KLEINHAUS, F. (Prag. med. Wchnschr. xix, s. 558, 1894). Age 39, menstruation regular, last period three months ago. Nullipara. *Chief symptoms:* For past three months is conscious of the presence of a tumor in the right lower abdomen, which is rapidly increasing in size, is also constipated and suffers from disuria. *Diagnosis:* An interstitial myoma of the posterior lip of cervix, supravaginally located, and complicating a three months' gravidity. *Operation:* Abdominal hysterectomy, Recovery.

30. DUNCAN, W. (Trans. Obst. Soc. London, xxxvi, p. 114, 1894) Age 34, menstruated regularly up to one year ago. Nullipara. *Chief symptoms:* Metrorrhagia and pains in lower abdomen for one year. *Diagnosis:* Submucous cervical myoma of the posterior lip, intravaginal in location. *Operation:* Vaginal myomectomy. Recovery.

31. HORROCKS, P. (Trans. Obst. Soc. London, xxxvi, p. 116, 1894). Age 40, nullipara. *Diagnosis:* submucous cervical myoma of the posterior lip, intravaginal in location. *Operation.* Vaginal myomectomy, Recovery.

32. COLLE. (Gaz. d. hop. de Toulouse, ix, p. 179, 1895). Age 41, para three. *Chief symptoms:* Metrorrhagia and painful micturition since last childbirth. *Diagnosis:* Interstitial cervical myoma of the right side. *Operation:* Vaginal myomectomy.

33. FOLET (Bull. Med. Paris, x, p. 473, 1896). Age 41, began to menstruate at 17. Para three, last one three years ago, instrumental delivery. *Chief symptoms:* Menorrhagia, backache, abdominal pains, disuria and obstipation for two years. *Diagnosis:* Interstitial cervical myoma of the right half, situated supra- and infravaginally. *Operation:* Vaginal hysteromyomectomy.

34. CULLINGWORTH, C. J. (Trans. Obst. Soc. Lond., xxxviii, p. 8, 1896). Age 49, menstruation began at 18, regular, menopause set in one year ago. Nullipara. *Chief symptoms:* For past six weeks noticed a rapidly growing tumor in the lower abdomen, pains in the rectum and in the umbilical region. No bladder or rectal disturbances. *Diagnosis:* A subperitoneal cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal hysterectomy for fibrocystic myoma of cervix.

35. RICKETTS, E. (Trans. Am. Assn. of Obst. and Gyn. ix, p. 252, 1896). Age 26, para two, last one three years ago. One miscarriage. *Chief symptoms:* Pregnant in the fifth month, hydramnios and bleeding for past two months. *Diagnosis:* Submucous cervical myoma of the left side. *Operation:* Porro operation. Recovery.

36. PALM, R. (Arch. of Gyn. Berl., liii, p. 92, 1897). *Diagnosis:* Submucous cervical myoma of the posterior lip, intravaginally located.

37. NOBLE, G. H. (Alabama Med. and Surg. Age, ix, No. 4, p. 177, 1897). Menstruation normal, para two, last one six years ago. No miscarriages. *Chief symptoms:* Soon after her first confinement a tumor of the cervix the size of a marble was diagnosed. After the second confinement this tumor enlarged to the size of an egg. Then followed prolapse and ulceration of the tumor, accompanied by fever, frequent urination and constipation. *Diagnosis:* Submucous cervical myoma of the anterior lip, intravaginal in location. *Operation:* Vaginal amputation of cervix and tumor.

38. NOTO, A. (Arch. di Obstet. e Ginec., Napoli, iv, p. 540, 1897). Age 42, menstruation regular. Para one, no miscarriage. *Chief symptoms:* Menorrhagia for two years. *Diagnosis:* Submucous cervical myoma of the anterior lip, situated supravaginally. *Operation:* Vaginal myomectomy. Cured.

39. NOTO, A. (ibid.). Age 42, para nine, one abortion. *Chief symptoms:* Metrorrhagia since last childbirth, fœtid vaginal discharges, weight in hypogastrium. *Diagn sis:* Submucous cervical myoma of the posterior lip, intravaginally situated. *Operation:* Vaginal myomectomy. Cured.

40. SUTTON, J. B. (Trans. Obst. Soc. Lond., xxxix, p. 160, 1897). Age 38, para two. *Chief symptoms:* Difficult and troublesome micturition. *Diagnosis:* Subperitoneal cervical myoma, supravaginally located.

41. FREY, P. (Inaug. Diss. Greifswald, 1897). Age 44, menstruation began at 14, regular and painless. Menopause set in one year ago. Para one, seven years ago, instrumental delivery. *Chief symptoms.* Recently has noticed the appearance of a tumor at the introitus vaginæ, otherwise felt well. *Diagnosis:* Submucous cervical myoma of anterior lip, located intravaginally.

42. BARBOUR and VAUTRIN (Ann. de Gyn. et d'Obst., l, p. 142, 1898). Age 53, began to menstruate at 14, regularly. Menopause set in three years ago. Nullipara. *Chief symptoms:* For past eighteen months profuse offensive vaginal discharges. *Diagnosis:* Submucous cervical myoma of the posterior lip, located intravaginally. *Operation:* Vaginal myomectomy.

43. THIELE (Diss. Greifswald, 1898). Age 41, menstruation regular. Para nine, puerperiums normal. *Chief symptoms:* During the last two labors this tumor was present but it interfered with last delivery only. *Diagnosis:* Pedunculated submucous cervical myoma of the posterior lip, intravaginally located.

44. LÖHLEIN, H. (Deutsch. med. Wchnsch., xvi, 1899). Age 37, para two, last one eight years ago. *Chief symptoms:* Menorrhagia for past five days. *Diagnosis:* Submucous cervical myoma of the anterior lip, located supra- and intravaginally. *Operation:* Abdominal myomectomy followed by a vaginal hysterectomy. Cured.

45. LÖHLEIN, H. (ibid.). Age 36, menstruation began at 18, regular and painless. Married, nullipara. *Chief symptoms:* Dysmenorrhœa, disuria and retention for one year. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the posterior lip, located intra- and supravaginally. *Operation:* Abdominal panhysterectomy. Recovery.

46. LÖHLEIN, H. (ibid.). Age 38, menstruation regular but profuse. *Chief symptoms:* Pressure pains in abdomen. *Diagnosis:* Interstitial cervical myoma of the anterior lip, supravaginal in location. *Operation:* Supravaginal hysterectomy. Cured.

47. LÖHLEIN, H. (ibid.). Age 45, menstruation regular and profuse. Para one, six years ago. *Chief symptoms:* For past six months gradual increase in the size of her abdomen, constipation, no urinary disturbances. *Diagnosis:* Subperitoneal cervical myoma of the posterior lip, supra- and infravaginally located. *Operation:* Laparotomy, double oöphorectomy. Improved.

48. AMANN, J. A., JR. (Monatschr. f. Geb. u. Gyn., No. 10, p. 825, 1899). *Diagnosis:* Submucous and interstitial cervical myoma of the anterior lip, located infravaginally. *Operation:* Abdominal panhysterectomy. Cured.

49. SCHAEFFER (Ztschr. f. Geb. u. Gyn., xli, p. 351, 1901). Age 48. *Chief symptoms:* Hæmorrhages and offensive vaginal discharges for six months. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the right half. *Operation:* Abdominal panhysterectomy.

50. HOLBAN (Wien. klin. Wchnsch., xvii, s. 397, 1901). Age 38, menstruation regular and painless. Para seven, last one ten months ago, transverse presentation. *Chief symptoms:* Fourteen days after the last labor a mass prolapsed from the vagina; since then bladder and bowel

disturbances. *Diagnosis:* Submucous and interstitial cervical myoma of the anterior lip, located intravaginally *Operation:* Vaginal myomectomy.

51. LEWERS, A. H. N. (Brit. Med. J., ii, p. 63, 1901). Age 38, menstruation began at the age of eleven, regular and painless. Single. *Chief symptoms:* For past three years menstruation is profuse, irregular and painful. *Diagnosis:* Interstitial cervical myoma of the anterior lip, located intravaginally. *Operation:* Abdominal hysteromyomectomy. Cured.

52. LEWERS, A. H. N. (ibid.). Age 37, began to menstruate at 14, irregularly and painless, during the last two years she menstruated only three times. Married, nullipara, miscarried once, two years ago. *Chief symptoms:* About six months ago, she began to suffer with backache, disturbed urination and constipation. *Diagnosis:* Interstitial cervical myoma of the posterior lip, located supra- and infravaginally. *Operation:* Abdominal hysterectomy. Cured.

53. LEWERS. A. H. N. (ibid.). Age 49, menstruation began at 13, regular, moderate in amount. Single. *Chief symptoms:* For about four months is complaining of painful urination. About one year ago has noticed an enlargement of the abdomen. *Diagnosis:* Subperitoneal and interstitial cervical myoma of the posterior lip, supra- and intravaginal in location, and complicated by uterine fibroids. *Operation:* Abdominal hysterectomy. Cured.

54. LEWERS, A. H. N. (ibid.). Single. *Chief symptoms:* For past 18 months has noticed an abdominal tumor, and for some years menorrhagia. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the posterior lip, situated supra- and intravaginally. *Operation:* Abdominal panhysterectomy. Cured.

55. VITRY, G. (Bull. de la Soc. Anat. de Paris, lxxvii, p. 659, 1902). Age 50. *Chief symptoms:* Enlargement of abdomen for past few years. *Diagnosis:* Subperitoneal cervical myoma of the posterior lip, supravaginal in location. *Operation.* Abdominal hysterectomy. Cured.

56. PETIT, R., et WEINBERG (Bull. de la Soc. Anat. de Paris, lxxvii, p. 660, 1902). Age 46, menstruation began at 11, regular and painless. Para two, last one 25 years ago. *Chief symptoms:* Metrorrhagia for eight years. *Diagnosis:* Submucous cervical myoma intravaginal in location. *Operation:* Cured.

57. BLAND-SUTTON (Lancet, Lond., i, p. 931, 1903). Single. *Chief symptoms:* Metrorrhagia and anæmia. *Diagnosis:* Submucous cervical myoma, intravaginal in location. *Operation:* Panhysterectomy. Cured.

58. BLAND-SUTTON (ibid.). Age 45, single. *Chief symptoms:* Pelvic pressure and retention of urine. *Diagnosis:* Submucous cervical myoma, intravaginal in position. *Operation:* Panhysterectomy. Cured.

59. BLAND-SUTTON (ibid.). Age 45, single. *Chief symptoms:* Disuria and menorrhagia. *Diagnosis:* Interstitial cervical myoma of the posterior lip, supravaginal in location. *Operation:* Panhysterectomy. Cured.

60. BLAND-SUTTON (ibid). Age 52, para six. *Chief symptoms:* Profuse and prolonged menstruation. *Diagnosis:* Submucous, intravaginal cervical myoma. *Operation:* Panhysterectomy. Cured.

61. BLAND-SUTTON (ibid.). Age 38, menstruation regular and scanty. Single. *Chief symptoms:* Frequent micturition. *Diagnosis:* Submucous, intravaginal cervical myoma. *Operation:* Supravaginal hysterectomy. Cured.

62. BLAND-SUTTON (ibid.). Age 36, para four. *Chief symptoms:* Amenorrhœa for three months and frequent micturition. *Diagnosis:* Interstitial cervical myoma of the anterior lip, supravaginal in location. *Operation:* Abdominal myomectomy. Cured. Nine months after the operation gave birth to a full term child.

63. BLAND-SUTTON (ibid.). Age 49, para two. *Chief symptoms:* Disuria, irregular menstruation, and pressure on rectum. *Diagnosis:* Submucous, intravaginal, cervical myoma. *Operation:* Panhysterectomy. Cured.

64. BLAND-SUTTON (ibid.). Age 45, para six. *Chief symptoms:* Irregular menstruation, but not profuse. *Diagnosis:* Submucous and interstitial cervical myoma of the anterior lip, supravaginal in location. *Operation:* Supravaginal hysterectomy. Cured.

65. BLAND-SUTTON (ibid.). Age 43, para one, one abortion. *Chief symptoms:* Profuse metrorrhagia. *Diagnosis:* Submucous intravaginal cervical myoma. *Operation:* Vaginal myomectomy.

66. BLAND-SUTTON (ibid.). Age 31, nullipara. *Chief symptoms:* Pressure pains in bladder and painful coitus. *Diagnosis:* Interstitial and intravaginal cervical myoma of the anterior lip. *Operation:* Vaginal myomectomy. Cured.

67. GALABIN (Trans. Obst. Soc. Lond., xlv, p. 175, 1903). Age 27, para one, thirteen months ago, one miscarriage nine months ago. *Chief symptoms:* For four months retention of urine. *Diagnosis:* Interstitial cervical myoma of the posterior lip, supravaginally located. *Operation:* Abdominal hysterectomy. Cured.

68. GALABIN (ibid.). Age 44, menstruation irregular and scanty. Para one, twenty-one years ago. *Chief symptoms:* Pain in left side of abdomen for five months, frequent and painful urination, and the presence of a tumor for past four months. *Diagnosis:* Interstitial cervical myoma of the posterior lip, supravaginal in location. *Operation:* Abdominal removal of tumor. Cured.

69. GALABIN (ibid.). Age 55, para four, the last one twenty-four years ago. *Chief symptoms:* Menopause set in two years ago. For eight years preceding the menopause suffered from menorrhagia. For past two years difficult micturition. *Diagnosis:* Submucous cervical myoma of the posterior lip. *Operation:* Abdominal hysterectomy. Cured. In this case the tumor increased in size after menopause.

70. TATE, W. (Trans. Obst. Soc. Lond., xlv, p. 173, 1903). Age 25. menstruation began at 15, regular and moderate in amount. Single. *Chief symptoms:* Eighteen months ago began to complain of pain in the lower abdomen. One month ago a tumor was discovered. Lately frequent micturition and increased constipation. *Diagnosis:* Subperitoneal cervical myoma of the anterior lip, supravaginal in location. *Operation:* Abdominal hysterectomy. Cured.

71. TATE, W. (ibid.). Age 29, menstruation regular and scanty. Single. *Chief symptoms:* One year ago noticed a tumor in her abdomen, frequent micturition. *Diagnosis:* Subperitoneal, supravaginal cervical myoma of the posterior lip. *Operation:* Abdominal. Cured.

72. FAIRBAIRN, J. S. (Trans. Obst. Soc. Lond., xlv, p. 178, 1903). Age 37. Menstruation regular and moderate. Para five, last one twelve years ago. *Chief symptoms:* For two months has noticed a lump in her abdomen, and since then suffers from profuse vaginal discharge, frequent micturition and metrorrhagia. *Diagnosis:* Submucous and interstitial cervical myoma of the anterior lip, supravaginally located. *Operation:* Abdominally. Cured.

73. JESSETT, F. B. (Brit. Gyn. J., xx, p. 82, 1904-05). Age 48. Nullipara. *Chief symptoms:* Five years ago noticed some pain in her abdomen, for four years menorrhagia, backache, frequent micturition and pain. *Diagnosis:* Subperitoneal cervical myoma of the anterior lip, supravaginal in location. *Operation:* Abdominal panhysterectomy. Cured.

74. LOCKYER, G. (Brit. Med. J., Lond., ii, p. 1081, 1904). Age 22. *Chief symptoms:* Metrorrhagia and pressure sensation. *Diagnosis:* Interstitial cervical myoma of the posterior lip, supravaginally located. *Operation:* Myomectomy in 1901, in 1903 abdominal panhysterectomy for the recurring cervical fibroid. Cured.

75. LOCKYER, C. (ibid.). Age 33, menstruation began at 15, regular until five years ago. Married. Nullipara. *Chief symptoms:* Menorrhagia and dysmenorrhœa for five years. *Diagnosis:* Interstitial cervical myoma of the posterior lip, supravaginal in position. *Operation:* Abdominal panhysterectomy. Cured.

76. ZACHARIAS, P. (Ztschr. f. Geb. u. Gyn., liii, p. 182, 1904). Age 39, menstruation began at 16, profuse. Nullipara. *Chief symptoms:* Offensive serous discharge for past six months, and metrorrhagia for six weeks. *Diagnosis:* Diffuse myoma of the entire cervix, intravaginally located.

77. GOTTSCHALK (Deutsch. med. Wchnsch., xxix, p. 785, 1903). Age 51, para three, last one 17 years ago. *Chief symptoms:* Metrorrhagia, urinary and bowel disturbances. *Diagnosis:* Submucous and interstitial cervical myoma of anterior lip, intravaginal in location. *Operation:* Vaginal myomectomy. Cured.

78. BÖHNKE (ibid.) (v. Beilage p. 279, 1903). Para five. *Chief symptoms:* Metrorrhagia for fourteen years. *Diagnosis:* Submucous cervical myoma of left side, intravaginal in location. *Operation:* Vaginal myomectomy during labor.

79. MEREDITH, W. A. (Trans. Obst. Soc. Lond., xlvi, p. 12, 1904). Age 48, single. *Chief symptoms:* Menorrhagia for two years, then pressure symptoms. *Diagnosis:* Interstitial, supravaginal cervical myoma of posterior lip. *Operation:* Abdominal hysterectomy. Cured.

80. QUASS, F. W. (Inaug. Diss. Leipzig, 1904). Age 39, menstruation began at 16, regular and painless. Nullipara. *Chief symptoms:* Backache, foul smelling discharge and bleeding. *Diagnosis:* Submucous, supra- and intravaginal cervical myoma of posterior lip. *Operation:* First myomectomy, then panhysterectomy. Cured.

81. VORBECK, F. W. (Inaug. Diss. Berlin, 1904). Age 49, menstruation began at 20, regular. Multipara, last child fifteen years ago. *Chief symptoms:* For past two years metrorrhagia, difficulty in micturition and dyspnœa. *Diagnosis:* Submucous intravaginal cervical myoma of the anterior lip.

82. VORBECK, F. W. (ibid.). Age 20, menstruation began at 15, regular, last period nine days ago. Single. *Chief symptoms:* Leucorrhœa. *Diagnosis:* Interstitial, intravaginal cervical myoma of the anterior lip. *Operation:* Vaginal myomectomy. Cured.

83. PERNICE (ibid.). *Diagnosis:* Intravaginal cervical myoma of the posterior lip.

84. GOTTSCHALK (ibid.). Multipara. *Diagnosis:* Intravaginal cervical myoma of the posterior lip. Not operated upon.

85. MIKUCKI (ibid.). *Diagnosis:* Intravaginal cervical myoma of posterior lip; the myoma was pediculated and delivered itself spontaneously.

86. DE PAUL (ibid.). *Diagnosis:* Intravaginal cervical myoma of the anterior lip. *Operation:* Vaginal myomectomy during labor. Cured.

87. CHIARI (ibid.). *Diagnosis:* Intravaginal cervical myoma of the anterior lip.

88. ATTHIL (ibid.). *Diagnosis:* Cervical myoma of the anterior lip.

89. PFISTER, S. (Inaug. Diss. Münch., 1902). Age 52, multipara. *Chief symptoms:* Metrorrhagia and backache for four years. *Diagnosis:* Subperitoneal supravaginal cervical myoma of the posterior lip. Died from peritonitis.

90. MEISENBACH, A. H. (J. Miss. Med. Ass., ii, p. 238, 1905–06). Age 42, single. *Chief symptoms:* For four months irregular and excessive menstrual pains in left side. *Diagnosis:* Interstitial cervical myoma, supravaginally located. *Operation:* Panhysterectomy for fibroid of cervix and corpus, complicating a six weeks' pregnancy and double ovarian cysts.

91. SMITH, C. A. (Northwest Med. J., iii, p. 21, 1905). Age 47, menstruation regular. *Chief symptoms:* Attacks of uterine hæmorrhage. *Diagnosis:* Subperitoneal cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal hysterectomy. Cured.

92. LEVISON, CH. G. (Am. J. Obst., liii, p. 671). Age 27, never menstruated. *Diagnosis:* Interstitial myoma of entire cervix, occluding the canal completely and causing a hæmatometra. *Operation:* Abdominal hysterectomy. Died.

93. MCILROY, A. L. (Scot. Med. and Surg. J., xix, p. 419). Age 56. Multipara. *Chief symptoms:* Metrorrhagia and pressure pains for three years. *Diagnosis:* Interstitial cervical myoma of the posterior lip, located supra- and intravaginally. *Operation:* Abdominal hysterectomy.

94. SCHAUTA, F. (Allgem. Wien. Med. Ztschr., 1905). Age 27, began to menstruate at 14, regular, profuse and painless. Para five, last one five years ago. *Chief symptoms:* For past nine days stranguria and retention, also frequent defecation. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal hysterectomy. Cured.

95. (Ibid.). Age 47, began to menstruate at 16, regular, profuse and painless. Married. nullipara. *Chief symptoms:* Metrorrhagia, disuria and enlargement of abdomen. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the posterior lip, located supravaginally. *Operation:* Supravaginal hysterectomy. Cured.

96. (Ibid.). Age 46, began to menstruate at 17, regular and moderate. Para four, the last one twenty-three years ago. One miscarriage. *Chief symptoms:* Dysmenorrhœa, menorrhagia and leucorrhœa for past six years. *Diagnosis:* Submucous cervical fibroid of anterior lip, located intravaginally. *Operation:* Vaginal hysterectomy. Cured.

97. Age 49, menstruation irregular, painful and profuse. Married. Nullipara. *Chief symptoms:* Six years ago was operated for a myoma of the uterus. Three years ago noticed a recurrence of the tumor. *Diagnosis:* Subperitoneal supravaginal cervical myoma of the anterior lip.

98. (Ibid.). Age 35, began to menstruate at 13, regular and painless. Para two, last one 13 years ago. *Chief symptoms:* For five years has been conscious of the presence of a tumor. *Diagnosis:* Subperitoneal, supravaginal cervical myoma of the anterior lip. *Operation:* Supravaginal hysterectomy. Cured

99. (Ibid.). Age 34, menstruation began at 15, normal. Married, nullipara. *Chief symptoms:* Dysmenorrhœa for thirteen years. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the anterior lip, located supravaginally. *Operation:* Abdominal myomectomy. Cured.

100. (Ibid.). Age 52, began to menstruate at 14, profusely. Single. *Chief symptoms:* For past three years is conscious of the presence of a tumor in the lower abdomen, also metrorrhagia for two months. *Diagnosis:* Subperitoneal cervical myoma of the anterior lip, located supravaginally. *Operation:* Abdominal panhysterectomy. Cured.

101. (Ibid.). Age 46, began to menstruate at 14, regular and profuse. Married, nullipara. *Chief symptoms:* Dysmenorrhœa for twelve years, urination slightly painful. *Diagnosis:* Cervical myoma of the right side

supravaginally located. *Operation:* supravaginal hysterectomy. Cured.

102. (Ibid.). Age 44, menstruation began at 17, regular and scanty. Single. *Chief symptoms:* For three years pains in lower abdomen, and urinary disturbances. *Diagnosis:* Subperitoneal cervical myoma, of the posterior lip, supravaginally located. *Operation:* Abdominal panhysterectomy. Cured.

103. (Ibid.). Age 45, menstruation began at 12, regular, moderate and painless. Married, three premature births. *Chief symptoms:* Pains in lower abdomen, preceding menstruation. *Diagnosis:* Supravaginal cervical myoma; not operated.

104. (Ibid.). Age 53, menstruation was regular and moderate. Married. *Chief symptoms:* Dysmenorrhœa for three years, lately metrorrhagia. *Diagnosis:* Subperitoneal, supravaginal cervical myoma of the anterior lip. *Operation:* Abdominal hysterectomy. Cured.

105. (Ibid.). Age 50, menstruation began at 15, regular, profuse and painless. Married, para five, last child seven years ago. Seven miscarriages, last one nine years ago. *Chief symptoms:* Metrorrhagia for two years. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the anterior lip, located supravaginally. *Operation:* Abdominal hysterectomy. Cured.

106. (Ibid.). Age 37, menstruation normal. Single. *Chief symptoms:* Menorrhagia for two years. *Diagnosis:* Subperitoneal cervical myoma of the anterior lip, located supravaginally. *Operation:* Abdominal hysterectomy. Cured.

107. (Ibid.). Age 41, began to menstruate at 16, regular, moderate and painless. Married, para two. *Chief symptoms:* Menorrhagia for four months. *Diagnosis:* Interstitial cervical myoma. *Operation:* Vaginal hysterectomy. Cured.

108. (Ibid.). Age 49, menstruation began at 13, regular and scanty. Married, para three. *Chief symptoms:* Menorrhagia for three years. *Diagnosis:* Submucous cervical myoma, located intravaginally. *Operation:* Vaginal hysterectomy. Cured.

109. (Ibid.). Age 40, menstruation began at 13, regular and profuse. Para three. *Chief symptoms:* Menorrhagia and abdominal enlargement for one year. *Diagnosis:* Subperitoneal cervical myoma of the anterior lip, located supravaginally. *Operation:* Abdominal hysterectomy. Died.

110. (Ibid.). Age 43, menstruation began at 20, regular and profuse. Married, para four. *Chief symptoms:* Metrorrhagia for three years. *Diagnosis:* Submucous and interstitial cervical myoma of the anterior lip, located intravaginally. *Operation:* Vaginal hysterectomy. Cured.

111. (Ibid.). Age 33, began to menstruate at 16, regular and moderate. Married, nullipara. *Chief symptoms:* Menorrhagia, dysmenorrhœa and increase in the size of the abdomen for two years. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the anterior lip, located supravaginally. *Operation:* Vaginal hysterectomy. Cured.

112. (Ibid.). Age 50, menstruation began at 13, profuse and painful. Married, para two. Three abortions. *Chief symptoms:* Metrorrhagia for one year. *Diagnosis:* Submucous and interstitial cervical myoma of the anterior lip, intravaginally located. *Operation:* Vaginal hysterectomy. Cured.

113. (Ibid.). Age 40, menstruation regular and profuse. Nullipara, one miscarriage 15 years ago. *Chief symptoms:* Dysmenorrhœa and pains in the lower abdomen for three years. *Diagnosis:* Interstitial cervical myoma of the anterior lip, located supravaginally. *Operation:* Supravaginal hysterectomy. Cured.

114. (Ibid.). Age 40. *Diagnosis:* Cervical myoma of anterior lip. *Operation:* Vaginal hysterectomy. Cured.

115. (Ibid.). Age 46, menstruation began at 16, regular, painless, moderate. Married, para five. *Chief symptoms:* For five years pains in the left side of abdomen. *Diagnosis:* Interstitial cervical myoma of the anterior lip, intravaginally located. *Operation:* Vaginal hysterectomy.

116. (Ibid.). Age 29, married, nullipara. *Chief symptoms:* Menorrhagia. *Diagnosis:* Cervical myoma of anterior lip. *Operation:* Abdominal hysterectomy.

117. LEJARS, F. (Compt. Rend. de la Soc. d'Obst. et de Gyn. et de Ped. de Paris, viii, p. 143, 1906). Age 40, menstruation began at 14, regular and profuse. *Chief symptoms:* Abdominal cramps for five years. *Diagnosis:* Subperitoneal cervical myoma of the anterior lip, supravaginally located. *Operation:* Supravaginal hysterectomy. Cured.

118. FLATAU (Zentralbl. f. Gyn., No. 6, s. 186, 1906). Age 27, married, nullipara. *Diagnosis:* Subperitoneal cervical myoma. *Operation:* Abdominal hysterectomy.

119. MORRISON, J. R. (Lancet, London, i, p. 354, 1907). Age 45, married, para eight, last child three and a half years ago. *Chief symptoms:* Metrorrhagia and difficulty in micturition since last confinement. *Diagnosis:* Interstitial cervical myoma of the anterior lip, located intra- and supravaginally. *Operation:* Abdominal hysterectomy. Cured.

120. MCCANN, F. (Proc. Royal Med. Soc. Lond. Sect. Obst., p. 147, 1909). Age 42, para two. *Chief symptoms:* Metrorrhagia, foul smelling vaginal discharge and incontinence of urine for several months. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the anterior lip, located supra- and infravaginally. *Operation:* Abdominal hysterectomy. Cured.

121. GILES, A. S. (ibid., p. 184). Age 50, menopause set in six years ago. Para seven, one miscarriage. *Chief symptoms:* Increase in the size of the abdomen, frequent and difficult micturition and constipation. *Diagnosis:* Subperitoneal cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal hysterectomy. Cured.

122. PURSLOW, C. E. (Birmingham Med. Rev., No. 66, p. 169, 1909). Age 30, married, nullipara. *Chief symptoms:* Menorrhagia for nine months. *Diagnosis:* Submucous cervical myoma of the posterior lip, located intravaginally. *Operation:* Vaginal myomectomy. Recovery.

123. (Ibid.). Age 47, menstruation regular and profuse. Para eight, abortions two. *Diagnosis:* A subperitoneal cervical myoma of the right side, located supravaginally. *Operation:* Abdominal myomectomy and hysterectomy. Cured.

124. (Ibid.). Last period six months ago. Married, para one. *Chief symptoms:* For two months pains in lower abdomen. *Operation:* Hysterectomy for fibroid of cervix, complicating a six months' pregnancy.

125. BLAND-SUTTON (J. Obst. and Gyn. Brit. Emp., xii, p. 434). Age 39, primigravida in the fourth month. *Chief symptoms:* Sudden attack of pain and vomiting. *Operation:* Abdominal hysterectomy for cervical fibroid complicating pregnancy.

126. STARK, J. N. (J. Obst. Gyn. Brit. Emp., xi, p. 486, 1907). Age 40, menstruation normal. Married, nullipara. *Chief symptoms:* For four years gradual swelling of abdomen. *Diagnosis:* Interstitial and subperitoneal cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal hysterectomy.

127. CAMERON, S. J. M. (Glasgow Med. J., lxxv, p. 380, 1911). *Chief symptoms:* Metrorrhagia and pelvic

discomfort. *Diagnosis:* Interstitial cervical myoma. *Operation:* Abdominal myomectomy and hysterectomy. Cured.

128. (Ibid). Primipara. *Chief symptoms:* Pelvic pains. *Diagnosis:* Subperitoneal cervical myoma. *Operation:* Abdominal hysterectomy. Cured.

129. BROUN, LE ROY (Am. J. Obst., lxiv, p. 508, 1911). Age 38, single. *Chief symptoms:* Abdominal pains. *Diagnosis:* Interstitial cervical myoma of the posterior lip, located supravaginally. *Operation:* Abdominal hysterectomy.

130. DE KESTER, M. (J. de sc. Med. di Lille, ii, p. 413, 1910). Age 52, menopause one year ago. Married, para five. *Chief symptoms:* Leucorrhœa for two years, and metrorrhagia for past six months. *Diagnosis:* Interstitial cervical myoma, located intravaginally. *Operation:* Vaginal myomectomy.

131. CACKAVIC, M. V. (Zentralbl. f. Gyn., No. 44, p. 1328, 1904). *Diagnosis:* Submucous, cervical myoma of the posterior lip, located intravaginally. *Operation:* Vaginal myomectomy.

132. WATHEN, WM. H. (Kentucky Med. J., p. 191, 1911). Age 36, *Chief symptoms:* Pressure pains in pelvis. *Diagnosis:* Subperitoneal cervical myoma. *Operation:* Abdominal removal.

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21. SAMES, F. Beitrag zur Atiologie der Uterusmyome und ihrer Histohenex. Inaug. Diss., Berlin, 1901.
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A MALFORMATION OF THE FALLOPIAN TUBE[1]

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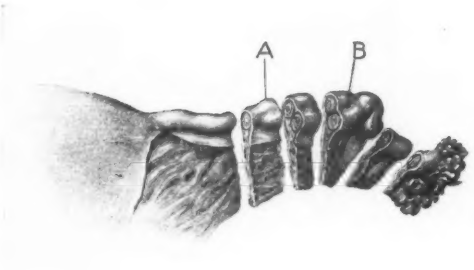
THE more delicate anomalies of the Fallopian tube which may occur through developmental errors have not received the attention that they should. What bearing they may have upon some morbid conditions not clearly understood remains to be determined. Some twenty years ago Landau and Rheinstein and, in this country J. W. Williams, called attention to the probable causal relation of diverticula of the tube to ectopic pregnancy. At that time, however, the interpretations of the anatomy of ectopic pregnancies were not perfect, for it had not yet been learned how the ovum normally embeds itself beneath the surface epithelium, as shown later by Peters, Bryce, Teacher, and others. To-day, in this connection, we should again turn our

[1] From the Department of Clinical Pathology, Columbia University, Professor F. C. Wood, Director.



A. Point at which communication between the two tubes exists.

B. Point at which the two tubes communicate directly with the outer portion of the ampulla.

attention to the subject of anomalies of the tube, not that we believe in such a naïve explanation, as mechanical obstruction to the passage of the ovum as being the cause of tubal pregnancy, but rather in a more probable explanation, such as implantation of the ovum in an anomalous embedding area. At present our knowledge is not far enough advanced to recognize such delicate anomalies, nor are we always able to determine with any degree of certainty whether or not the gross anatomy of a tube in which an ovum has embedded itself was previously normal. We are obliged, therefore, to have recourse to some suggestive facts in forming a basis for any speculation as to the cause of tubal pregnancy, and these facts are that menstruating tubes, anomalous tubes, and tubes containing decidua vera (alone) have been observed. The extent of these observations has not been sufficient to give us any idea as to the frequency of their occurrence. It is with a view to putting on record a detailed description of an anomalous tube that could have functionated, that this case is reported.

Another point of interest in regard to anomalies of the tubes is their association with *fibromyomata* of the uterus. Abel has mentioned, and Wetheril has described, a case of supernumerary oviducts associated with fibromyoma uteri.

Description: This tube was removed from a virgin in conjunction with a fibromyoma of the uterus, by Dr. E. B. Cragin on the gynecological division of the Sloane Hospital for Women. On a merely casual observation the tube might have been passed as normal, but upon careful inspection the double condition in the region of the inner half of the ampulla was detected. Here the indications of two tubes were evident, although the diameter of the two together did not exceed that of a normal tube. From the posterior aspect the posterior tube appeared to end blindly at the junction of the anterior with the isthmus. Upon making serial sections, an anteroposterior communication between the two was found to exist at the point indicated by A in the figure. At the point B both tubes communicated directly with the outer portion of the ampulla. Each tube has separate well developed circular and longitudinal muscular walls, but both are held together by a common subserosa and peritoneal coat. The mucosa in each appears normal.

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HÆMOLYTIC STREPTOCOCCUS AND PUERPERAL SEPTICÆMIA[1]

A Bacteriological Study of One Hundred and Three Labor Cases, with Reference to Prognosis, Prophylaxis and Specific Therapy

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INTRODUCTION

THIS research comprises a systematic bacteriological study of one hundred and three consecutive labor cases ante- and post-partum, with special reference to the presence or absence of hæmolytic streptococci in the posterior cul-de-sac, cervix and blood circulation, as determined by the blood-agar method (Schottmüller). The work was carried on at the St. Mary's Lying-In Hospital, the bacteriological laboratory of Tufts Medical School, and the private laboratory of one of us (Medalia).

The object of this work has been to help clear up the following unsettled questions of the bacteriology of puerperal septicæmia:

1. Is the strepto, hæmolytic or non-hæmolytic, present in parturient canal during pregnancy, before any digital examinations have been made, and in afebrile cases post-partum?

2. Is the blood-agar method (details of which will be described later) practical as well as reliable in its application to puerperal cases to determine the hæmolytic characteristics of the streptococcus?

3. Is the hæmolytic property sufficient to differentiate between the virulent and non-virulent types of strepto, as claimed by some authors?

4. Is the routine bacteriological examination of maternity cases of clinical value in institutions as well as in private practice?

(*a*) In establishing the autogenous and exogenous source of puerperal sepsis?

(*b*) In determining the presence of healthy carriers of puerperal sepsis?

BRIEF HISTORIC NOTES

Puerperal septicæmia was recognized in the early historic period. Hippocrates (460–377 B. C.) was the first to give a clear description of its symptoms, ascribing it to suppression of lochial discharge, and considered it inevitably fatal. Mercantus (1570) was the first to consider putrefaction of the lochial discharge as the chief cause of puerperal sepsis. He believed it to be the result of inflammation of the uterus following labor.

Strother, in 1716, was the first to use the name puerperal fever in his essay on fevers. Kirkland, in 1774, definitely recognized the contagiousness of the disease. He attributed it to inflammation of the uterus and absorption of putrid material.

Gordon of Aberdeen (1795) demonstrated the infective nature of the disease. He showed that only women who were attended by such practitioners and nurses who had previously attended other patients suffering from the same affection would get the disease.

Oliver Wendell Holmes, in his "Essay on Contagiousness of Puerperal Fever" (1843), brought forth overwhelming evidence to the effect that the disease was carried from patient to patient by the physician and nurse. But his views were strongly opposed by the leading obstetricians of that period.

Semmelweis, of the Lying-In Hospital of Vienna, concluded from his observations that the introduction of "cadavric poison" was the immediate cause of puerperal sepsis. The introduction of the use of chlorine water by him, and later the solution of chloride of lime for the use of the hands of the students and nurses attending labor cases, reduced the mortality rate to three per cent and in 1848 to as low a figure as 1.27 per cent. The conclusions and teachings of Semmelweis were the subject of a great deal of controversy among the profession for a long time, and his prophy-

[1] Read at the Meeting of the Norfolk District Medical Society, March 26, 1912.

lactic measures were ridiculed as being of no value at all by a great many colleagues and leading obstetricians. His theories were finally widely recognized when Pasteur demonstrated the specific relation of bacteria to infection (1860–3).

Tarnier (1857), in a thesis written on the subject, came independently to the same conclusions as those of Semmelweis. He concluded that puerperal favor was a form of blood poisoning, and was the first to name it "puerperal sepsis."

In 1864 Rokitansky discovered the presence of bacteria in the lochial discharge of women suffering from puerperal fever, and in 1865 Myerhofer identified the streptococcus in the same. Coze and Feltz (1869) demonstrated the presence of organisms in the blood of a woman dying of puerperal sepsis. It was left to Pasteur (1869) to definitely establish the relation of the streptococcus to puerperal sepsis. In a number of experiments carried on by him in the maternity wards of Hotel Dieu, he found the streptococcus in the lochial discharge of infected women, in their blood and also in the tissues of the same, post-mortem.

BRIEF RÉSUMÉ OF RECENT LITERATURE

After Pasteur's demonstration of the streptococcus as the cause of puerperal sepsis, a number of investigators found this organism in the lochia of afebrile healthy parturient women. In fact, the streptococcus was found by Bumm in the vagina in fifty per cent of normal pregnant women and in seventy-five per cent of the normal post-partum cases. Schenk and Scheib (2) found the streptococcus present in lochial discharge (7th to 9th day post-partum) in thirty-three per cent of the normal labor cases.

It is now recognized by the majority of authors that the streptococcus is present in the vagina of normal pregnant women in from ten to forty per cent. The percentage of positive findings is even higher in the lochia post-partum.

It was therefore natural, on the part of the investigators, to assume that the streptococci found in the normal pregnant and parturient women were different from those found to cause sepsis. The question as to whether these apparently avirulent streptococci have anything in common with the virulent forms has been well put by Bumm (1) in the Communication of the tenth German Gynæcological Meeting, Wurtzburg, 1903, where he says: "The great problem is this: Are the streptococci which we find regularly in the majority of cases of all pregnant and parturient women, identical with the streptococci found in septic wound infection only existing in a temporary avirulent stage; and have they nothing at all in common with the streptococci causing septic infection, except only an outside similarity in form, belonging altogether to another harmless type of organism? I believe that at this stage all the future bacteriologic researches will have to be applied towards the differentiating of the various types of streptococci found. That streptococci are present in the genitalia, can not be doubted to-day. The question to be studied now is the relation of such to the quality of the streptococci derived from sepsis."

The importance, from a clinical standpoint, of finding a method which would enable one to determine whether the particular streptococcus found is pathogenic or saprophytic is, of course, obvious. Various investigators have therefore tried to find some characteristic property or method which would enable them to distinguish between the virulent pathogenic streptococci and the non-virulent saprophytic types.

This problem has given rise to a great deal of controversy and much research. Thus, we find the morphologic differentiation of the streptococcus into "Longus" and "Brevis," advanced by Von Lingelsheim (3). This has been disproven by Marmoreck (4) who demonstrated that the above characteristic depends upon the culture media and the age of the same.

Hiss (5) laid great stress upon the difference in power of the various streptococci to ferment carbohydrates. This, too, was disproven by the work of Gordon (6) and by others who found a great deal of irregularity in the fermentation reaction.

The immunity reactions carried out by

Aronson (7), Marmoreck (8), Fischer (9) and others, also the agglutination phenomenon were found by the above mentioned authors only to help confirm the interrelation of the various types of streptococci rather than to separate them. The agglutination phenomenon as a means of differentiating the various types of streptococci was first suggested by Van de Velde (10) and Bordet (11).

Besredka (12) claimed a great deal for the compliment fixation test, while other investigators have shown that the compliment fixation test is of as little value in differentiating the various strains of strepto as are the agglutination tests cited above.

Animal inoculation as a means of establishing the virulence of the streptococci, though it at first sight would seem a reliable test, has been given up, since it was found that streptococci isolated from most severe human infections have, at times, very little influence on laboratory animals, and vice versa. The irregularity in virulence of the same strain of strepto to laboratory animals has been demonstrated by Besredka[1] (12), where he says, "The streptococci derived from human sources are generally slightly pathogenic to laboratory animals."

Bordet (11) (1897) was the first to describe the phenomenon of hæmolysis produced by the streptococci. He observed it in rabbits dying of streptococcus infection. Von Lingelsheim (3) studied hæmolysis of the streptococci in blood decalcified by means of sodium citrate and also in blood bouillon.

Ehrlich's discovery (1898) of a hæmolytic substance produced by the tetanus bacillus stimulated further study of the hæmolytic property of bacteria, including the streptococcus. Marmoreck (4) (1902) believes that hæmolysis is a common characteristic to all streptococci, and that the intensity of hæmolysis is directly related to its virulence. He writes,[2] "that not only do the streptococci dissolve the red corpuscles within the blood-vessels of the host, but this hæmolytic property is increased in proportion with its virulence. The more a streptococcus is virulent, the more is it capable of dissolving the red corpuscles."

[1] Annals de l'Institut Pasteur, 1904.
[2] Annals de l'Institut Pasteur, 1902.

The above findings he met with while studying the exaltation of virulence of streptococci by means of a series of rabbit inoculation. As to the hæmolytic property in vitro, he says, "The streptococci may present some differences, always minor differences, depending upon their origin." The same belief is shared by Aronson (13) and Menzer (14).

On the other hand, Von Lingelsheim (15), Lubenau (16), Besredka (17), Levin (18), Schlesinger (19) and Schottmüller (20) are all of the opinion that hæmolysis is a characteristic belonging to only a portion of the streptococcus group, and is not common to all streptococci.

Schottmüller (20) (1903), following a careful study of the streptococcus in puerperal septicæmia and other infections, was enabled to classify this group of organisms into three types. He based his classification upon the ability of certain streptococci to dissolve red blood corpuscles (hæmolysis) when grown upon blood-agar medium, and also upon its morphology. The following is his classification:

1. "Streptococcus longus seu erysipelatos," which is the most virulent form, capable of producing long chains, and when grown upon blood-agar (Schottmüller) gives rise to black colonies surrounded by a clear halo of resorption of the hæmoglobin from the neighboring corpuscles.

2. "Streptococcus mitior seu viridens"—less virulent, if at all, producing short chains, giving rise to greenish colonies without macroscopic hæmolysis, usually met with in mild infections.

3. "Streptococcus mucosus"—giving rise to opalescent colonies without hæmolysis. This type has been met with by Schottmüller in only seven benign cases, and probably belongs to the pneumococcus rather than to the streptococcus group.

This classification of the streptococcus advanced by Schottmüller, especially as to its relation to puerperal sepsis, gave rise to very heated controversies. It stimulated a great deal of research tending to confirm or refute his conclusions. We will now briefly review the more important published investigations on this subject.

Bauman (21) and Nieter (22), who made a very extensive study of the streptococcus, both pathogenic as well as saprophytic, found that all streptococci derived from human infections were hæmolytic, while on the other hand, the saprophytic streptococci derived from fæces, milk and skin were found to be non-hæmolytic. They thus tend to confirm Schottmüller's classification.

The principal investigators who are in favor of Schottmüller's classification are Gonnet (23) and Fromme (24). Both these authors studied bacteriologically the vaginal secretion during pregnancy and the lochial discharge as well as the blood on blood-agar medium. Gonnet (23) from his investigation of one hundred cases ante-partum and post-partum, concluded that although streptococci are present in normal pregnant women yet they are not hæmolytic streptococci. He says, "In none of our cases did we find colonies with resorbing zones. Our one hundred cases did not have streptococci pyogenes in their vaginal cavity during pregnancy. Sixteen per cent did produce, on culture, streptococcus gracilis (Mitior or Viridens). The above results are important as showing that without blood-agar we would have probably declared that we found the streptococcus pyogenes in the vagina in sixteen per cent of the cases."

It is perfectly evident that this author considered that the absence of hæmolysis as shown upon blood-agar also meant absence of virulence.

The same one hundred cases examined by him post-partum showed ninety cases free from streptococci. Six showed streptococcus gracilis, while they had no streptococci during pregnancy; these remained apyretic. Four had typical hæmolytic streptococcus; the clinical picture of these four cases was that of a true puerperal infection. These four had no streptococcus ante-partum. Sixteen that had non-hæmolytic streptococcus during pregnancy showed no streptococcus post-partum.

He concludes that the streptococcus (pyogenes) does not exist in the vaginal cavity — it is brought from the outside. The non-hæmolytic streptococcus, on the other hand, does exist in the vagina during pregnancy and may disappear during parturition. When present post-partum it does not give rise to any clinical symptoms. According to him, therefore, the hæmolytic streptococcus is not present in the vagina or lochial discharge of normal healthy women.

He examined the blood of six cases of puerperal sepsis by means of blood-agar medium. He found them all positive to hæmolytic streptococcus and all ended fatally. He thus emphasizes the relation of hæmolysis to virulence, as pointed out by Schottmüller.

Fromme (24) found the streptococcus in nineteen (52.7 per cent) out of thirty-three healthy labor cases. But none of these were of the hæmolytic variety. At that date (1908) he denied the presence of hæmolytic streptococcus in normal cases. Owing to further researches by Heynemann (25), however, he (43) rectified his previous view and admits the presence of hæmolytic streptococcus in three eighths of all labor cases, but he still adheres to Schottmüller's classification, believing in the polyvalency of the streptococcus. He considers the presence of hæmolytic streptococcus in normal cases analogous to the finding of typical diphtheria bacilli and typhoid bacilli in healthy carriers.

He therefore considers the possibility of healthy carriers of puerperal septicæmia. He further says that these women are more apt to become septic than those in whom we find no hæmolytic streptococci, also that the patient is in danger whose pulse and temperature rise and in whose vagina or uterus there are found hæmolytic streptococci. He tries to explain the finding of hæmolytic streptococcus in healthy women as being due "partly to attenuation of virulence and especially to heightened resistance of the individual towards the bacteria."

The presence of hæmolytic streptococci in the lochial discharge of afebrile healthy parturients is now admitted by almost all investigators. The percentage of positive findings, however, varies greatly with the different observers, as the following table will illustrate:

PRESENCE OF HÆMOLYTIC STREPTOCOCCI IN THE LOCHIA OF AFEBRILE POST-PARTUM CASES

	No. of cases examined	Positive findings	Percentage
Sigwart (26)	56	38	68
eynemann (25)	50	31	62
Lüdke & Polano (27)	30	8	27
Zangemeister (28)	..	..	13
Sachs (29)	20	1	5
Koch (30)	77	5	6.5
Fromme (43)	..	..	38
Fabre & Bourret (31)	60	9	11
Our own	103	5	5

The findings of hæmolytic streptococcus in the vagina of pregnant women has been demonstrated by only a few of the investigators, and that in a very small percentage of the cases, as the table below will illustrate. Its possibility is, however, denied by none. Even Zangemeister (32) who did not consider the bacteriological examination of the pregnant of much practical importance because of the absence of hæmolytic streptococci or other pathogenic bacteria admits in a later article (42) the presence of three per cent of hæmolytic streptococci in the vagina ante-partum. However, the casual finding of the hæmolytic streptococci ante-partum, we believe with Zangemeister, to be of little practical value.

PRESENCE OF THE HÆMOLYTIC STREPTOCOCCUS IN VAGINAL SECRETION DURING PREGNANCY

	No. of cases examined	Positive findings	Percentage
Gonnet (23)	100	0	0
Sigwart (26)	20	3	15
Schmidt (33)	100	7	7
Koch (30)	33	3	9
Hallenser, Klinic (34)	415	..	3
Lamers (34)	21	2	10
Our own	103	1	1

The establishment of the presence of hæmolytic streptococci in women, both during pregnancy and post-partum, without infectious symptoms, gave rise to a great deal of controversy as to the value of the blood-agar method from a clinical standpoint, also as to the reliability of hæmolysis as an index to virulence of a given streptococcus. It also stimulated a great deal of research tending to establish or refute the contention of Schottmüller, Gonnet, and Fromme, who believe in the polyvalency of the streptococcus.

Natvig (35) demonstrated that it is possible to obtain, on artificial culture media, two types of hæmolysis, one resulting from acid production and common to all types of streptococci, the other kind due to a special hæmolysin and possibly inherent in the hæmolytic streptococcus only. According to him, therefore, it is possible to obtain hæmolysis with all types of streptococci under certain conditions of cultivation. In other words, he does not believe in the polyvalency of the streptococcus as distinguished by hæmolysis. All streptococci are in his opinion one and the same organism.

The demonstration of the possibility of transforming the hæmolytic streptococcus into a non-hæmolytic, and vice versa, which would tend to confirm the unification of the streptococcus group, has been undertaken by various investigators.

The following observers have been able to transform the hæmolytic streptococcus into non-hæmolytic by various methods, mostly in vitro, some by means of passage through animals: Scheib (36), Fromme (24), Heynemann (25), Zoeppritz (37), Schmidt (33), Bondy (38) and Zangemeister (39). Others have described the transformation of non-hæmolytic streptococcus into hæmolytic. They are Natvig (35), Freytag (40), Heynemann (25), Rieke (41), Schlesinger (19) and others.

The published reports of the transformation of the hæmolytic into non-hæmolytic streptococcus and vice versa, also the occurrence of hæmolytic streptococci in the normal pregnant and parturient cases — all these would at first sight seem to render the hæmolytic property, as a means of differentiation between the various types of the streptococci, of no value clinically. However, a critical examination of these reports shows that the successful attempts of changing a hæmolytic into a non-hæmolytic streptococcus have been few and negligible in number, while the attempts at changing a non-hæmolytic into a hæmolytic, which is a more important transformation scientifically, have been successful in still fewer instances, and by a far lesser number of observers. Although the reports of the interchangeability of the hæmolytic

streptococcus have some value from a scientific point, pure and simple, as supporting the unity of all types of streptococci, still clinically it is of very little value, as will be shown later.

On the other hand, the cumulative evidence as found in the literature with reference to the presence of hæmolytic streptococcus in the lochia and blood of septicæmia cases, the difference in the severity of the disease caused by the hæmolytic as compared with the non-hæmolytic type, also the production of bacteræmia in the septicæmia cases caused by hæmolytic streptococcus as compared with the practical absence of the bacteræmia in similar cases due to non-hæmolytic streptococcus in the lochia, as shown in the following table, all tend to prove the importance, from a clinical standpoint, of the hæmolytic property of the streptococci.

The figures in this table represent the average findings of most authors.

Ante-partum febrile cases showed:	
Hæmolytic streptococci in vagina	3
Non-hæmolytic streptococci in vagina	32
Post-partum febrile cases (in lochia and blood) *showed:*	
Those due to hæmolytic streptococci	50
Those due to hæmolytic streptococci that became bacteræmic	33
Those due to non-hæmolytic streptococci	23
Those due to non-hæmolytic streptococci that became bacteræmic	0
Those due to hæmolytic streptococci (bacteræmic) fatal	95–100
Those due to non-hæmolytic streptococci (bacteræmic) fatal	0

(Lenhartz, Gonnet, Fromme, Zangemeister, Cannon, Sachs, and others).

PERSONAL RESEARCH

It was the desire on our part to establish, if possible, the exogenous or autogenous source of puerperal infection; to find a quick and reliable method of determining the presence or absence of virulent streptococci in the parturient canal. Such a procedure was suggested to us by Gonnet's (23) description of Schottmüller's blood-agar method and his successful application of the same in connection with puerperal septicæmia. This gave us our first incentive to engage in this work.

BLOOD-AGAR METHOD

It was Sittman who first suggested blood-agar culture media in 1894 for bacteriological purposes. Lenhartz (46) was the first to make use of this method for clinical purposes. His pupil, Schottmüller (20), perfected this method and described his observation of the streptococcus as it appears on the blood-agar plates, by means of which the presence of the streptococcus can be quickly ascertained (fourteen to sixteen hours of incubation) and its virulence determined. His method of preparing the blood-agar is as follows:

BLOOD-AGAR — METHOD OF PREPARATION

Schottmüller (20) found that the best and most reliable results are obtained by mixing 2 cc. of fresh human blood with 5 cc. of plain agar. This mixture gives rise, upon cooling, to a solid culture medium upon which the pathogenic streptococcus grows in a characteristic way, producing fine black colonies surrounded by a halo of resorption (a transparent light zone), appearing as early as twelve to sixteen hours after incubation. He further observed that if more than 2 cc. of blood is used, hæmolysis will be delayed and the characteristic appearance may not occur. On the other hand, if less blood is used, other than the really pathogenic organism may also cause hæmolysis and thus be misleading.

The following is the detailed technique carried out by us in preparing blood-agar plates for our own work.

Tubes containing 5 cc. of plain agar were melted, brought down to, and maintained at 48° C. The blood was obtained from the median vein of the arm of the patient, under aseptic precautions as follows:

A rubber tourniquet is applied on the upper arm (above the elbow). Upon distention of the vein, the needle of a Luer glass syringe (of 5 cc. capacity), previously sterilized, is used. The needle is best introduced into the vein by first piercing the skin and then entering — thus avoiding going through the vein. The pressure of the distended vein will cause the piston to rise. At times slight traction on the piston is necessary to withdraw the blood. Two cc. of the fresh blood is introduced in each of the melted agar tubes; the mixture is gently agitated by rolling the tube between the palms of the hands. The mouth of the tube is passed through the flame and the mixture is poured into a sterile petri dish.

The contents of the petri dish is allowed to harden. After hardening, the blood-agar cultures are put into the thermostat (at 37° C) bottom side up, to prevent the water of condensation from flowing all over the medium and causing a diffuse growth. The plates are examined at the end of 12 to 24 hours, and if found sterile they are used for surface cultures, as will be later described.

In all our cases we saw no bad results or discomfort to the patient from obtaining the blood in this way.

We made use of this blood-agar method in our ante- and post-partum examination in a consecutive series of 103 cases. We were fortunate that almost all of our cases were primiparæ, and also that they were under observation during the interval between the ante-partum bacteriological examination and date of delivery. This interval varied from 60 days to 6 hours (see detailed chart), the variation being due to the irregularity of admission of the patients to the hospital.

This circumstance enabled us to study these cases ante-partum before any digital examination had been made. The chance of infection between the time of examination and date of delivery was thus particularly minimized. This fact does away, to a certain extent, with Zangemeister's (32—p. 34) objection to the importance of a routine ante-partum examination, where he says "an importation of pathogenic bacteria is possible to take place any time between the period of bacteriological examination during pregnancy and the time of labor."

TECHNIQUE OF THE BACTERIOLOGICAL EXAMINATIONS

The following technique was used in the ante-partum bacteriological examination: On entering the hospital all patients were given a bath, preferably a shower, as the ordinary tub bath was considered by us to favor the possibility of contamination by the washings entering the genital tract. As early as convenient afterward (from 12 to 36 hours) the patient was brought into the examining room and placed in the lithotomy position on a table, in good light. A nurse, sterilized as for an operation, cleansed the external genitalia with soap and water, weak bichloride, followed by sterile water, special attention being paid to the parts beneath the labia, which were kept separated by a sterile sponge. An extra long bivalve speculum, a cervical speculum (burrage), a pair of long dressing forceps, all sterilized, together with a small sterile sponge, completed the outfit for examination. The culture media consisted of one glucose agar slant, one milk glucose agar slant, a sterile blood plate, sterile swabs, platinum wire loop and a flame. With sterile rubber gloves the bivalve speculum was carefully introduced between the separated labia and the cervix exposed. The external os carefully cleansed with a sterile gauze "wipe," the cervical speculum was then introduced. A culture was taken from the canal by means of a sterile swab and planted on milk glucose agar by rotating the swab over the culture medium and also inserted in the water of condensation. From the same location, a surface culture was made on one half of a plate of blood-agar with a platinum loop. The cervical speculum was then withdrawn through the bivalve; the latter was allowed to remain in its position. A culture was taken by means of a swab from the posterior cul-de-sac on glucose agar slant. From the same location, by means of a platinum loop, a surface culture was made on the other half of the same blood-agar plate.

All the cultures were placed in the incubator at 37° C. and were examined by inspection at end of 12 to 24 hours. Smears were then made from the growth on the surface, also from the water of condensation of the slants, stained in the ordinary way and examined under the microscope. Owing to the lack of material, the direct surface cultures on the blood-agar plates we had to forego as a routine examination. In all cases, however, whenever the streptococcus was found present on any of the culture media employed, sub-cultures were made on the surface of blood-agar plates for purposes of determining the presence or absence of the hæmolytic property of the streptococcus in question.

The post-partum cultures were obtained in the same way from the posterior cul-de-sac and uterus (employing the same technique as described) on the third, fifth, or seventh day,

and earlier than the third day if there were any indications of temperature (100° F. or over).

During the ante-partum period no douches were given. At the close of labor, when indicated, an extrauterine or vaginal douche of sterile hot water was occasionally given purely as a hydrotherapeutic measure. No germicidal douche was given at any time. During the post-partum period, whenever douching was indicated as a local measure the cultures were first obtained. If curettage was necessary, the cultures were similarly previously obtained. The systematic cleansing of the patient post-partum with a vulvar spray of sterile hot water was the only routine hygienic measure employed. The blood for an opsonic index was taken before and after labor as a routine for purposes of establishing the diagnostic value of the opsonic index in these cases. The opsonic index was tested in a large number of the cases (see table) but was not carried out systematically in all. In every case where the streptococcus was found ante-partum, the cultures were kept on hand, ready to be made up into an autogenous vaccine if the indication should warrant it post-partum. In this way much time was saved and prompt treatment by vaccine was assured.

We studied eight hundred fourteen cultures on various media obtained from the one hundred three cases. We also examined, in addition, one hundred sixty direct blood cultures from eighty of the same one hundred three cases, thirty-five ante-partum and forty-five post-partum.

ANTE-PARTUM AND POST-PARTUM RESULTS OF THE ONE HUNDRED THREE CASES

We will confine ourselves to the bacteriological findings with reference to the streptococcus only. The bacteriological examination of the one hundred three cases ante-partum and post-partum was carried out with the above described technique. Cultures were made from the posterior cul-de-sac and cervix on glucose agar, milk glucose agar and blood-agar plates. Milk agar was used because one of us (Medalia) found this culture medium to be particularly valuable for the growth of the streptococcus. It is prepared by mixing two thirds sterilized three per cent glucose-agar with one third sterile milk at a temperature of 78° to 80° C, tubed and slanted in the ordinary way.

A. Results of the 103 cases examined ante-partum.

	No. of cases in which present.
Hæmolytic streptococcus	1
Non-hæmolytic streptococcus	21
Bacteria other than streptococcus (staphylo, pneumo, colon, pseudo K. L., and other unidentified organisms)	76
Sterile (no bacteria of any kind)	5

Bacterial findings as to location in the 103 cases examined ante-partum.

1. CERVIX —	
Hæmolytic streptococcus	1
Non-hæmolytic streptococcus	11
Bacteria other than streptococcus (staphylo, pneumo, colon, pseudo K. L., and other unidentified organisms)	74
Sterile (no bacteria of any sort)	17
2. VAGINA (posterior cul-de-sac)—	
Hæmolytic streptococcus	0
Non-hæmolytic streptococcus	18
Bacteria other than streptococcus	79
Sterile	6

B. Results of the same 103 cases examined post-partum.

Hæmolytic streptococcus	9
Non-hæmolytic streptococcus	17
Bacteria other than streptococcus	76
Sterile	1

Bacterial findings as to location in the same 103 cases post-partum.

1. CERVIX —	
Hæmolytic streptococcus	6
Non-hæmolytic streptococcus	11
Bacteria other than streptococcus	75
Sterile	11
2. VAGINA (posterior cul-de-sac)—	
Hæmolytic streptococcus	9
Non-hæmolytic streptococcus	13
Bacteria other than streptococcus	80
Sterile	1

So far we have cited the findings of the cases as a whole. We will now consider the presence of the streptococci in febrile and afebrile cases of the same series. We considered a case febrile (arbitrarily) when it showed a temperature of 100.4° F. or over during the lying-in period. A morbid temperature we considered the rise of 100° F. on any two bi-daily readings from the end of the first day to the eighth day post-partum (recommended by the British Medical Association as a criterion for morbidity). In our

series of 103 cases there were 22 febrile cases, 11 of which showed a morbid temperature according to the above adopted standards.

Febrile cases (22), including cases with morbid temperature, *showed*:

	No. of cases in which present.
Hæmolytic streptococcus	4
Non-hæmolytic streptococcus	9
Bacteria other than streptococcus	8
Extragenital	1
Cases with morbid temperature only (11)—	
Hæmolytic streptococcus	2
Non-hæmolytic streptococcus	5
Bacteria other than streptococcus	4
Afebrile cases (81)—	
Hæmolytic streptococcus (4.15%)	5
Non-hæmolytic streptococcus (15.71%)	19
Bacteria other than streptococcus	56
Sterile	1

In the one case showing hæmolytic streptococcus ante-partum the ante-partum cultures were taken one day before delivery. It is noteworthy in this case that the cultures ante-partum were positive in the cervix and negative in the vagina. We cannot explain this coincidence. Post-partum, however, the findings were positive both in cervix and posterior cul-de-sac.

One of the nine cases that showed hæmolytic streptococcus post-partum had the same streptococcus ante-partum as was just described, while the other eight cases that showed hæmolytic streptococcus post-partum had no such streptococcus nor any other type of streptococcus ante-partum.

Out of seventeen cases showing non-hæmolytic streptococcus post-partum nine had the organisms ante-partum, while the other eight had no such streptococcus ante-partum. The question naturally arises — where did these streptococci, both the hæmolytic and non-hæmolytic, in these sixteen post-partum cases come from? We will confine ourselves for the present as regards this question to the hæmolytic streptococcus. Many possibilities explaining the post-partum positive finding as against the ante-partum negative finding of this organism have been advanced by various authors.

1. The possibility of overlooking the hæmolytic streptococcus ante-partum owing to the small number present at that period, as claimed by many men, especially Schmidt (33). Lamers (34), in order to prove this possibility, obtained all secretions possible by means of a special spoon speculum. He inoculated all this secretion thus obtained from each case upon twenty-five to fifty blood glucose agar plates. In spite of this diligence he found, out of twenty-one cases thus examined ante-partum, only two containing hæmolytic streptococcus. He concludes, therefore, "that the finding of hæmolytic streptococcus in lochial secretion post-partum cannot be explained by the multiplication of the same bacteria already present in the secretion during pregnancy, which at the time are overlooked on account of their small numbers."

This possibility is to be ruled out from our findings, since we found no hæmolytic streptococcus ante-partum in eight of the nine cases that were positive post-partum. Our cultures being obtained not with a platinum loop but with several swabs, we probably would not have overlooked it had it been present.

2. The second possibility is the introduction of these hæmolytic streptococci by digital examination. According to Lamers (34), these bacteria could not have been introduced by digital examination, since no examinations were made during delivery in his twenty-one cases, and yet he found thirteen cases post-partum positive out of nineteen ante-partum negatives. In our own research we have no conclusive evidence to rule out this possibility, since we made as many digital examinations as we thought necessary for the proper conduct of the case. The reason for our small number of positive hæmolytic findings post-partum as compared with Lamers' and others' might be explained by the fact that we prepared surgically the external genitalia and insisted upon a strict aseptic technique by the attendants. The cleansing of the external genitalia is of importance in this connection, since in ten per cent of the cases the hæmolytic streptococcus was found present on the vulva by Lamers (34) and others.

3. The third possibility is the contamination by the patient's own fingers or clothing from orifices or parts of the body. This possibility cannot be ruled out either, since

it is well known that streptococcus- and pneumococcus-sore throats, also erysipelas and the multiple staphylococcic infections, may all be coincident with any period or stage of puerperium. This extragenital infection has a direct bearing upon auto-infection during pregnancy or post-partum. In one case, at least, of our own series, where we had no hæmolytic streptococcus ante-partum, we found a hæmolytic streptococcus post-partum coinciding with an erysipelatous infection of the face.

4. The fourth possibility to be considered is that of transformation of a non-hæmolytic streptococcus already present ante-partum into a hæmolytic one post-partum. This brings up the question of monovalency of the streptococcus as contrasted with polyvalency. Zangemeister believes that the various types of streptococcus, hæmolytic, non-hæmolytic, viridens, etc., are one and the same organism and that their biochemical properties are interchangeable. Agreeing with him are Natvig, Heynemann, Rieke, Schlesinger, Lamers, and others. (For details see reference in the review of the literature above.) All these authors therefore believe in the monovalency of the streptococcus. Zangemeister gives "infectious strife" (Infektionskampf) with living tissue as a reason for the acquiring of the hæmolytic property by the streptococcus. This theory is, in our opinion, not tenable because of the fact that we found non-hæmolytic streptococcus as a cause of morbidity. There surely must have been "infectious strife with the living tissues" under such circumstances! Lamers also objects to this theory upon the same ground.

Similarly we cannot agree with Lamers' idea of "more favorable environment as a cause of the development of the hæmolytic property," for the reason that we found non-hæmolytic streptococcus under the best of environments, such as in operative cases with and without morbid temperature, and on the other hand, hæmolytic streptococcus were found present in non-operative afebrile cases.

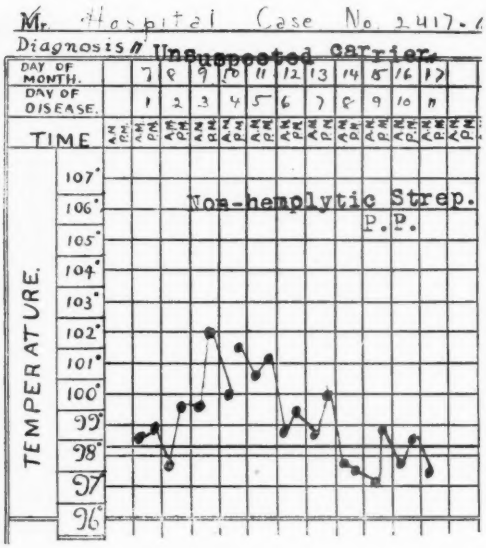
Schottmüller, on the other hand, is the principal exponent of polyvalency of the streptococcus group. Agreeing with him are Fromme, Gonnet and others.

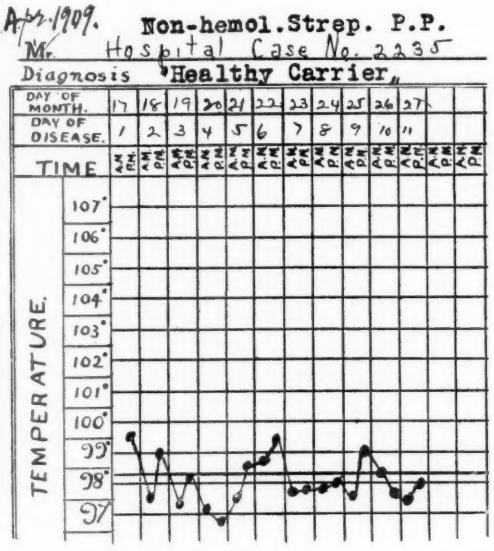
From our own observations we have to side with Schottmüller, as far as his classification goes, dividing the streptococci into hæmolytic and non-hæmolytic types. We base our conclusions upon the fact that we found hæmolytic streptococci ante-partum and post-partum in the same case, and also upon the absence of any question of metamorphosis of the hæmolytic streptococci into non-hæmolytic and vice versa (our eight post-partum cases with hæmolytic streptococcus having no streptococcus of either type ante-partum; our nine cases with non-hæmolytic streptococcus ante-partum having the same organism post-partum).

We cannot, however, agree with Schottmüller that hæmolytic streptococci are always virulent, since in our own series of 103 cases we found the hæmolytic streptococcus in five afebrile post-partum cases, and furthermore, we found the non-hæmolytic streptococcus in five cases with a morbid temperature and other signs of sepsis post-partum. Therefore from our findings we must conclude that there are two types of streptococci, hæmolytic and non-hæmolytic, as based upon the blood-agar method, but that the hæmolytic streptococcus is by no means exclusively virulent nor is the non-hæmolytic exclusively avirulent.

NON-HÆMOLYTIC STREPTOCOCCUS

The important points with regard to our findings of the non-hæmolytic streptococci are: the large percentage of ante-partum positive findings in our own series, amounting to twenty per cent. Nine cases had the same streptococcus post-partum as ante-partum, two of which showed morbid temperature, suggesting the possibility of auto-infection with the non-hæmolytic streptococcus. Eleven cases that showed non-hæmolytic streptococcus ante-partum showed no such post-partum. The cause of the disappearance of the streptococcus post-partum is a matter of conjecture. One of us (Medalia) suggested the following theory: The amniotic fluid, as well as the serum from the placental blood, contains antibodies capable of destroying many saprophytic bacteria, including attenuated or avirulent, non-hæmolytic streptococci. These antibodies are not, however,





capable of destroying the more virulent organisms, as seen above, where the streptococcus was found in the same cases ante-partum and post-partum. The increase in number of the bacteria with the increased number of days following delivery, as noted by various observers, is explained by the growth of the surviving flora after the antibodies of the blood and the amniotic fluid have been used up. As is well known, only a portion of bacteria will be killed off by a definite amount of blood serum. Those that remain will develop rapidly as time goes on.

The eight cases in whom we found the non-hæmolytic streptococci post-partum having had similar organisms ante-partum, two of which had a morbid temperature, further point to the fact that the non-hæmolytic cannot be excluded as being avirulent.

The answer to the question, "Where do these non-hæmolytic streptococci, found post-partum only, come from?" is the same as that given above for the hæmolytic type. To recapitulate: The reason for the presence of streptococci post-partum cannot be explained as being due to existing streptococci ante-partum which have been overlooked owing to their small number.

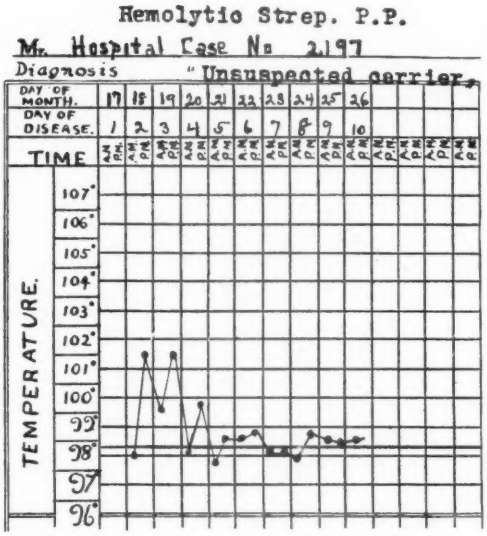
Second, the possibility of the streptococci being introduced by digital examination of attendant we cannot rule out and is the admitted source of exogenous infection. The responsibility of the attendant for the introduction of the streptococci by digital examination may in our opinion be direct or indirect. We understand by "direct responsibility" the importation by the attendant of the streptococci from outside sources foreign to the patient herself. "Indirect responsibility" we call the introduction of the bacteria by the attendant from surfaces or orifices of the same patient.

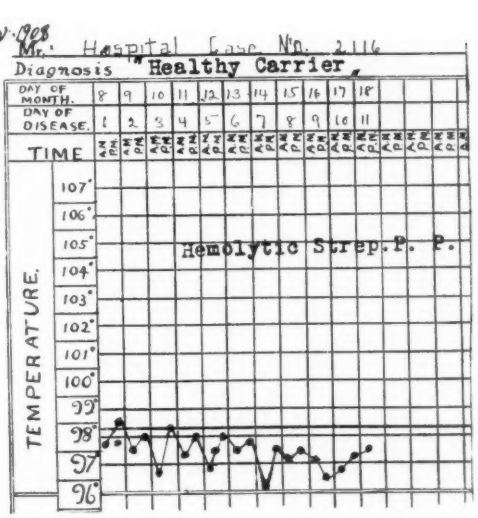
Third, the possibility of contamination by the patient's own fingers or clothing from other orifices or other parts of her body is to be seriously considered. This urges more careful instruction and supervision of the patient during pregnancy.

The possibility which deals with the transformation of hæmolytic streptococci, though we cannot deny it as a possibility, yet our own researches offer nothing to support it.

"HEALTHY" AND "UNSUSPECTED" CARRIERS OF PUERPERAL SEPSIS

Fromme (1908) (43) suggested the possibility that afebrile cases containing hæmolytic streptococci in the lochial secretion are





healthy carriers of puerperal sepsis. He cites the well-known analogies of typhoid carriers, diphtheria and meningococcic carriers. He also believes in the increased liability to infection of those healthy women who have hæmolytic streptococci in their secretion. He explains the finding the hæmolytic streptococci in afebrile cases as being due first, to the "attenuation of the virulence of the bacteria," and second, to "the increased resistance of the individual towards the bacteria as compared with other patients."

Fabre and Bourret (31) agree with Fromme as to healthy carriers, having found the hæmolytic streptococcus in eleven per cent of afebrile labor cases. They further describe another type of carriers whom they designate as "unsuspected (imprevue) carriers" of the streptococci. In this latter type of cases the clinical picture of infection is reduced to a minimum, such as a slight increase in temperature, which would not in itself permit of a positive diagnosis. The bacteriological examination, however, determines the true nature of the case.

In our own series we found five afebrile and two mildly febrile cases that would have been overlooked had we judged by the clinical signs alone. The presence of hæmolytic streptococci in the lochial discharge gave us timely warning for their isolation and the prevention of a possible spread of infection to other cases. We therefore have to side, from our own researches as to healthy carriers, with Fromme and especially with Fabre and Bourret as to "unsuspected carriers."

Furthermore our finding of the non-hæmolytic streptococci to be capable of causing morbidity in as many cases as the hæmolytic type, would lead us to consider the mildly febrile and afebrile cases, due to non-hæmolytic streptococci, fully as important as those due to the hæmolytic type as regards carriers. We have therefore, in cases with non-hæmolytic streptococci also, healthy and "unsuspected" carriers of puerperal infection.

AUTO-INFECTION

The question of auto-infection we have more or less considered indirectly by discussing the various possibilities of the origin of the streptococci post-partum. This problem of auto-infection is of sufficient importance in itself, however, to warrant separate consideration. According to our findings, the only two cases with morbid temperature out of the nine with hæmolytic streptococci post-partum had streptococci ante-partum. One of these

NUMBER	HOSPITAL NUMBER	AGE	PARITY	INTERVAL of LABOR or EXAMINATION IN DAYS	ANTE PARTUM OPSONIC INDEX STREPTO	STAPHYLO	PNEUMO	COLON	CLINICAL SYMPTOMS.	ANTE PARTUM SURFACE CULTURES MILK+PLAIN AGAR, BLOOD SERUM+BLOOD AGAR. BACTERIA IN CERVIX	BACTERIA IN POSTERIOR CUL de SAC	DIRECT	BLOOD CULTURES	HEMOLYSIS	DATE of BIRTH	INTERVAL of PP EXAMINATION	POST PARTUM OPSONIC INDEX STREPTO	STAPHYLO	PNEUMO	COLON	POST PARTUM SURFACE CULTURES BACTERIA IN CERVIX	BACTERIA IN POSTERIOR CUL de SAC	DIRECT	BLOOD CULTURES	HEMOLYSIS	MORBIDITY	DELIVERY OPERATIVE or NORMAL	COURSE of CONVALESCENCE
1	2098		1	3					Absent	Strepto	Strepto	Sterile	Absent		10-7-08	3					Staph.		Sterile	Absent	No (Sterile)	Normal	Normal
2	2096	18	1	3					"	Growth, No strepto.	Growth No strepto.				10-11-08	3					Strepto		Sterile	Absent	No	"	"
3	2099	26	1	1					"	Strepto	Short chain Strepto	Sterile	Absent		10-11-08	4					Colon b					"	Slight tear Convalescence delayed Albuminuria
4	2109	30	1	6hours					Albumuria	Growth No strepto	Growth No strepto				10-12-08	6					Colon b					"	Normal Saprae mia 3d to 7 day
5	2101	18	1	7	61				Absent.	Sterile No strepto	Colo bacillus No strepto				10-16-08	2					Strepto					"	
6	2108	18	1	6					"	Growth No strepto	Growth No strepto	Sterile	Absent		10-20-08	4					Strepto					"	Normal
7	2110	30	1	16					"	"	"				10-21-08	4					Long chain Strepto					"	"
8	2111	35	1	2					"	Sterile No strepto	Aurous No strepto	Sterile	Absent		11-1-08	7	1.36			1.02	Sterile					Forceps	"
9	2115	31	1	1					"	Growth No strepto	Growth No strepto.				11-7-08	5					Diplococcus No strepto					Normal	"
10	2116	21	1	2hours					"	Sterile	Albus No strepto				11-7-08	7	1.18			.93	Albus No strepto	Strepto	Sterile	Typical	"	"	"
11	2117	32	1	26					"	Sterile	Growth No strepto			Absent	11-10-08	4					Strepto					"	"
12	2137	16	1	11					"	Growth No strepto	"			Absent	11-11-08	5	0.83 1.10			.83 1.10	Strepto			Absent		"	Miscarriage	Phleb is febris after care Pneumonia in Throat
13	2138	41	1	7					"	Sterile No strepto	Sterile No strepto			Absent	11-15-08	4	1.08			1.05	"			Absent		"	Normal	Post partum Hemorrhage Convalescence normal
14	2136	38	1	36					"	Growth No strepto	Growth No strepto.				11-15-08	5					"					"	Normal
15	2139	44	7	46					"	Strepto	Strepto	Sterile	"		11-17-08	5	1.26			.69	Growth, No strepto.					"	Placenta Previa Version
16	2105	36	1	4	72		.61	Fever	Absent	Staphylo No strepto	Staphylo No strepto	Strepto	Present in Direct Culture Only		11-17-08	4	1.39			1.02	Strepto	Strepto	Specimens	"	Yes	Forceps	Strepto Abscess Colon Syphilis
17	2138	36	1	41					"	"	"				11-18-08	5	1.24			.91	Sterile	Growth No strepto	Sterile	—	No	Normal	Normal
18	2136	18	1	33					"	Sterile	Long chain Strepto			Absent	11-20-08	4	.87			.97	Strepto	Strepto	"	Absent	"	"	"
19	2145	19	1	12	1.05		.87	"	"	Staphylo Bacillus No strepto	Staphylo No strepto	Sterile			11-22-08	5	1.06			1.34	Diplococcus No strepto	Diplococcus No strepto	"	—	"	"	"
20	2156	31	1	6hours					"	Sterile No strepto	Sterile No strepto				12-1-08	5	.81			1.20	Growth No strepto	Growth No strepto	"	—	"	Version	"
21	2139	34	3	5	1.45		1.20	"	"	Growth No strepto	Growth No strepto				12-4-08	4	1.03			1.30	"	"	"	Absent	(Febrile)	Normal	"
22	2136	23	1	6					"	Short chain Strepto	Short chain Strepto	Sterile	Absent.		12-6-08	3	.94			1.27	Colon b No strepto	Colon b No strepto	"	—	No	Breech	" - Vaccine
23	2131	39	1	6hours	.89		.91	"	"	Strepto	Strepto.	Sterile	Absent		12-7-08	3					Staphylo No strepto	Staphylo No strepto	Sterile	"	"	Normal	"
24	2126	30	1	18					"	Staphylo No strepto	Staphylo No strepto				12-8-08	5	1.25			1.13	Growth No strepto	Growth No strepto	"	"	"	High Forceps	"
25	2135	25	1	31	1.13		.94	"	"	Colon b Strepto	Colon b Strepto	Sterile	Absent		12-8-08	5	1.06				"	"	"	"	"	Forceps	"
26	2134	28	1	17					"	Staphylo No strepto	Staphylo No strepto				12-10-08	7	1.03			1.11	"	Colon b No strepto	—	—	"	Normal	"
27	2155	25	1	18			.94	"	"	Growth No strepto	Growth No strepto				12-11-08	6				.84	"	Growth No strepto	—	—	"	"	"
28	2136	23	1	3	69		.96	"	"	"	Long chain Strepto	Sterile	Absent		12-12-08	3	.91			1.06	"	"	Sterile	—	Yes	Forceps	Saprae mia Retained Debris Temperature rises
29	2127	4	1	1	1.09		.93	"	"	"	Growth No strepto				12-14-08	4	.90			1.00	Colon b No strepto	Colon b No strepto	—	Absent	No	Breech	Normal
30	2139	17	1	8					"	Sterile No strepto	Sterile No strepto				12-15-08	5	1.01			1.09	Sterile No strepto	Sterile No strepto	—	—	"	Normal	"
31	2149	33	1	60					"	"	Growth No strepto			Absent	12-15-08	8					Sterile	"				"	"
32	2101	39	1	35					"	Growth	Staphylo Strepto	Sterile	"	"	12-15-08	5	.36				Growth No strepto	"	Sterile	Absent	"	"	"
33	2145	33	1	13	.86		.73	"	"	Sterile	Long chain Strepto	"	"	"	12-16-08	7	.33			1.05	"	"	"	—	"	"	"
34	2103	4	6hours					Eclampsia	"	Growth No strepto	Colon b No strepto				12-17-08	6	.86			1.04	"	"	"	—	"	Eclampsia Version	"
35	2146	27	1	1	1.11		.98	Absent	Absent	Sterile	Sterile			Absent	12-18-08	5	.74			1.05	"	"	"	—	"	Version	"
36	2147	35	1	5hours	1.19		.83	"	"	Growth No strepto	Growth No strepto				12-19-08	6	1.02			.98	"	"	Sterile	—	"	Normal	"
37	2148	25	1	9	1.04		1.10	"	"	No strepto	No strepto				12-21-08	7hours				1.10	"	"	—	—	"	Forceps	"
38	2101	28	1	20m	1.03		.88	Eclampsia	Absent	Sterile	Growth No strepto			Absent	12-22-08	6					"	"	—	—	"	Eclampsia Version	"
39	2153	37	1	1	.93		1.01	Absent	"	Growth No strepto.	"				12-24-08	3					"	"	—	—	"	Normal	"
40	2155	34	1	10	.78		.74	"	"	"	"				12-30-08	7	1.01			1.09	Sterile	"	—	—	"	"	"
41	2159	30	1	63				Albuminuria	"	"	"	Sterile	Absent		12-30-08	7					Growth No strepto	"	—	—	"	Forceps	"
42	2161	16	1	30	1.33		1.05	Absent	Absent	"	"	"	"	"	1-4-09	8	1.03			1.52	"	"	—	—	"	"	"
43	2119	17	1	9				"	"	Sterile	Sterile	"	"	"	1-4-09	5	1.26			.86	Strepto	Strepto	Sterile	Typical	"	Normal	Normal — Tonsilitis
44	2142	18	1	19	1.32		1.30	Facial Paralysis	"	Strepto Staphylo No strepto	Strepto Staphylo No strepto	Strepto	"	"	1-5-09	6	1.38	90	93	.99	"	"	"	"	"	"	Normal
45	2138	17	1	1	1.31	1.27	1.08	"	"	Strepto	Strepto	"	"	"	1-5-09	2	"	91	94	1.03	Diplococcus No strepto	Bacillus No strepto	—	Absent	(Slight rise)	"	Saprae mia
46	2138	17	1	10			.99	Absent	"	Staphylo No strepto	Staphylo No strepto	"	"	"	1-8-09	9					Strepto	Strepto	"	"	"	"	Normal
47	2144	18	1	20			1.01	"	"	Strepto	Strepto	"	"	"	1-9-09	6					Pneumo No strepto	Pneumo No strepto	"	"	"	"	"
48	2145	18	1	21			1.02	"	"	Strepto	Strepto	"	"	"	1-10-09	6	1.00	87	86	1.00	Pneumo No strepto	Pneumo No strepto	"	"	Yes	High Forceps	Pneumonia Infected Version
49	2146	19	1	22			1.03	"	"	Strepto	Strepto	"	"	"	1-10-09	7	1.00	92	88	1.01	Pneumo No strepto	Pneumo No strepto	"	"	"	Normal	Normal

was found distinctly hæmolytic ante-partum, while the other through an oversight was not tested to hæmolysis. Similarly we found two out of four cases with morbid temperature due to non-hæmolytic streptococci post-partum which had the same organism ante-partum. These facts seem to indicate to us that autogenous or self-infection plays quite a part in puerperal septicæmia, whether due to hæmolytic or non-hæmolytic streptococci. The principal advocates of auto-infection as being one of the causes of puerperal sepsis are Ahlfeld (44), Krönig (45), Schmidt (33) and Zangemeister (42). These investigators have come to their conclusions from similar researches as our own. Zangemeister claims that it is shown from his researches without doubt "that the streptococci present in the vagina ante-partum are responsible in a large number for puerperal sepsis. It is undoubtedly true that, given one hundred cases due to exogenous infection, there will be found among them a larger number of *severe* sepsis than would be present in one hundred cases due to auto-infection. It is true, however, that these auto-infections lead also to severe illness and fatal termination."

Zangemeister and Schmidt believe that auto-infection is due mainly to the streptococcus present in the vagina, while Krönig holds the streptococci found on the vulva as being chiefly responsible.

From our work, since we had surgically cleansed the external genitalia, thus doing away with the vulva bacteria, the cases of auto-infection in our series were therefore derived from the vagina and not from the vulva.

We wish to particularly emphasize in this connection that infection from outside sources is to be looked upon as most important. We do not, on the other hand, wish to emphasize auto-infection to such an extent as to impair the importance of personal asepsis and antisepsis in handling obstetric cases.

The question of a favorable soil, i. e. temporarily lowered resistance, tears, wounds, etc., on the part of the patient, is to be taken into consideration both with reference to auto-infection as well as exogenous infection.

DIRECT BLOOD-AGAR CULTURES

Direct blood cultures were taken ante-partum in thirty-five out of the one hundred three cases. All these cases were afebrile excepting one. The main reasons for taking these blood cultures were, first, to prove definitely the absence of bacteræmia ante-partum to be compared with the post-partum blood cultures, and secondly, to supply ourselves with sterile blood-agar plates for surface cultures for purposes of testing out the presence or absence of hæmolytic streptococci in the vagina and cervix. The one febrile ante-partum case is the only one that we found positive to hæmolytic streptococci in the blood. All the other thirty-four negative cases were afebrile.

Direct blood cultures post-partum were taken in forty-five out of the one hundred three cases. This number includes the febrile post-partum cases. All of them were found negative, also the one that was found positive ante-partum was sterile post-partum.

Unfortunately, from a scientific point of view, but fortunately for the patients, we found in none of our regular series a single bacteræmic case (even the eleven cases with morbid temperature were of a mild type). None of these cases died excepting one that succumbed to a staphylococcus general infection occurring after the lying-in period. In one case outside of this series we found hæmolytic streptococci that ran a septic temperature for eleven weeks. On one blood-agar plate from this case we counted one hundred twenty-seven colonies of hæmolytic streptococci. Six days later we found only four colonies in the blood and four days later still the blood was found negative. This patient had a deep-seated small abscess over the right trochanter showing a pure growth of hæmolytic streptococci. She also had small foci in the lungs. Autogenous streptococcus vaccine administered, the patient recovered.

Bacteræmic cases due to hæmolytic streptococci as noted in the literature show a mortality of ninety-five to one hundred per cent. The above cited case adds another instance where streptococcus bacteræmia, if found associated with local abscess formation, leads to recovery, as has been noted by other au-

thors. The vaccine treatment administered in this case might have helped to localize the disease and hasten recovery.

GENERAL SUMMARY

Streptococcus has been demonstrated to be the paramount cause of puerperal septicæmia (86 per cent). The finding of the streptococcus in a substantial number in the vagina of pregnant and in afebrile post-partum cases (30 to 40 per cent) suggest that there is a virulent and non-virulent type.

The various methods of differentiating the above types of streptococci advanced by the different investigators have led to no positive results. The classification advanced by Schottmüller (by means of his blood-agar method, in 1903, dividing the streptococci into a virulent group causing hæmolysis on his blood-agar and a non-virulent type causing no hæmolysis, has been objected to by a great many observers; first, because hæmolytic streptococci (supposedly virulent) have been found to cause no symptoms; secondly, because some authors claim to have been able to transform hæmolytic into non-hæmolytic, and vice versa. These objections to Schottmüller's classification, although they may be partly correct from a purely scientific point of view, yet, according to the published reports of almost all the observers, may be overlooked clinically.

Our own observations lead us to side with Schottmüller as to the presence of a hæmolytic and a non-hæmolytic type of streptococci, but we cannot agree with him that the hæmolytic streptococci are always virulent, nor that the non-hæmolytic streptococci are always avirulent.

As to the possible origin of the streptococci, hæmolytic and non-hæmolytic, post-partum in those cases containing no streptococci ante-partum, we have, first, the introduction by digital examination of attendant, which may be truly exogenous, being brought by the examiner from another patient, or introduced by the examining finger from the external genitalia of the same patient. Second, the contamination of the patient by her own fingers or clothing from other orifices or other parts of her body.

As to the carriers of puerperal septicæmia pointed out by Fromme, also "unsuspected carriers" described by Fabre and Bourret, we believe them to be of great importance. Our own series would lead us to include among healthy carriers and "unsuspected carriers" not only those cases that have the hæmolytic streptococci in their secretion, but also those containing non-hæmolytic streptococci.

Auto-infection as a cause of sepsis, pointed out by Ahlfeld, Krönig, Schmidt and Zangemeister, we found in our series to be an important factor, not, however, as important as exogenous infection, and it should not be emphasized to such an extent as to overshadow personal sepsis and antisepsis by attendant handling obstetric cases.

CONCLUSIONS

1. The streptococci, both hæmolytic and non-hæmolytic, are present in the parturient canal during pregnancy before any digital examination has been made as far as we could ascertain.

2. The presence of the hæmolytic streptococcus ante-partum is the exception and not the rule.

3. Non-hæmolytic streptococci are twenty times as frequent as hæmolytic streptococci in the secretions of the pregnant, according to our findings.

4. Hæmolytic streptococci are found in afebrile as well as in febrile parturient cases.

5. Non-hæmolytic streptococci are found in febrile as well as afebrile post-partum cases.

6. The frequency of positive findings post-partum of the non-hæmolytic is far above that of the hæmolytic type, being twice as many (17 to 9).

7. Schottmüller's blood-agar method is of practical value in detecting the hæmolytic property of the streptococcus.

8. The hæmolytic property is a characteristic of one type of the streptococcus group.

9. Hæmolysis as applied to the streptococcus does not determine the question of virulence or avirulence of this organism. Other tests will have to be found to establish the virulence or avirulence of a given streptococcus.

10. The routine bacteriological examination early post-partum is practical and important from the standpoint of prophylaxis, diagnosis, prognosis and treatment

11. The clinical symptoms alone are not sufficient to establish a diagnosis of puerperal septicæmia. The bacteriological examination is necessary to definitely establish diagnosis.

12. The finding of the streptococcus, hæmolytic or non-hæmolytic, in febrile or afebrile cases, would indicate prompt isolation of the case to prevent the spread of infection in maternity hospitals.

13. We have to recognize "healthy carriers" and "unsuspected carriers" of puerperal infection.

14. The finding of hæmolytic or non-hæmolytic streptococci in the secretion in febrile cases post-partum suggests the possibility of a grave infection.

15. The finding of hæmolytic streptococci in the blood is, according to most observers, synonymous with a fatal issue.

16. Hæmolytic or non-hæmolytic streptococci causing morbidity are not necessarily of exogenous origin.

17. Auto-infection plays an equal rôle with exogenous infection as to frequency of sepsis, but not as to its severity.

18. Extragenital infections with faulty personal hygiene on the part of the patient will increase the possibility of auto-infection during the puerperium.

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OPSONINS AND VACCINES IN PUERPERAL SEPSIS[1]

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We shall limit ourselves in this article to the study of the opsonic index and vaccine treatment, with reference only to the 103 cases which we had under observation in connection with the systematic bacteriological study ante and post-partum, as reported (in the same number of this journal).

The blood for the opsonic index was obtained before and after labor in a large number of the 103 cases for purposes of determining the value of the index, first, from a diagnostic point of view; second, as a means of establishing the virulence or avirulence of a streptococcus when found in a given patient; third, as a guide to vaccine treatment in these cases.

The following are, briefly, the results of this part of the research.

CASES WITH STREPTOCOCCUS CULTURALLY

Out of the 103 cases, 22 were tested to streptococcus and b. coli opsonic index. These were found afterwards to contain streptococci in the vagina and cervix ante-partum, or in the lochia post-partum, or both. Out of these 22 cases, 11 were tested ante-partum with the following results: 7 were found within normal limits (.80 and above); 4 were found below normal limits (.75 to .62). Three of these four with a low streptococcus index had fever post-partum.

The only one of the whole series of 103 cases that showed hæmolytic streptococcus ante-partum and post-partum showed the lowest index: .62 ante-partum and .53 post-partum. The other 3 had non-hæmolytic streptococcus ante-partum.

Of the same 22 cases, 18 were tested to the strepto-opsonic index post-partum with the following results: 14 were found within normal limits (.8 and above); 4 were found below normal limits (.75 to .53).

The two cases with the lowest indices (.53 and .54) were found to contain hæmolytic streptococci with morbid temperature. Of the other two (.73 and .71) one had no streptococci post-partum while the other had a non-hæmolytic streptococcus.

On the other hand, 4 of these 18 cases with high streptococcus indices had hæmolytic streptococci in the lochial discharge, but none of these 4 had morbid temperature.

It would seem from the above findings that a low strepto-opsonic index, when found in a case suffering from a streptococcus infection, is suggestive that the organism in question is a virulent one, though nothing definite can be said from so small a number.

CASES WITHOUT STREPTOCOCCUS CULTURALLY

Out of the 103 cases, 37 were tested to the streptococcus and b. coli opsonic indices which were found culturally to have no streptococci of either type in the parturient canal ante-partum or post-partum. Out of these 37 cases, 26 were tested ante-partum with the following results: 10 were found below normal limits

[1]Read at the Meeting of the Norfolk District Medical Society, March 26, 1912.

(.75 to .52), making almost 40 per cent; 16 were found within normal limits (.8 or above).

Of the same 37 cases, 24 were tested post-partum with the following results: 3 were found below normal (.74, .66, and .64 respectively); 21 were found within normal limits or slightly above.

As said before, none of these 37 cases contained streptococci of either type ante-partum or post-partum.

The opsonic findings of the non-streptococcic ante-partum cases seem to suggest that the low streptococcus opsonic index cannot be considered as an indication of a streptococcus infection, nor that there are present streptococci in the parturient canal, at least as far as the normal pregnants are concerned. The low index may mean a low resistance to streptococcus or an extragenital infection on the part of the pregnant woman in whom the low index is found, and should be taken into consideration from the standpoint of prophylactic immunization.

The post-partum findings, however, seem to be more reliable, since in only 3 (12 per cent) of the 24 cases tested post-partum were they found low to streptococcus, while the other 21 normal cases were found also normal to the strepto-opsonic index, thus leaving 88 per cent of correct findings. Here, too, no definite conclusions can be drawn from these findings. It suggests, however, the need of further work along these lines. (For details see chart of preceding article.)

VACCINE THERAPY

In this series of 103 cases 5 were treated with streptococcus autovaccine and one with pneumococcus autogenous vaccine. One of the five was treated with a combined strepto and colon vaccine. Four of them were distinctly morbid, suffering with a streptococcus infection.

The following is a brief résumé of the cases treated.

CASE 1 (2105). Two days ante-partum temperature 102, hæmolytic streptococcus in the blood ante-partum, non-hæmolytic streptococci in the vaginal secretion, strepto-opsonic index .72.

Delivery: ether, forceps. Perineum intact, post-partum temperature 104 on afternoon of delivery. Strepto-opsonic index post-partum .73.

Cultures, from lochial discharge on fourth day post-partum showed a non-hæmolytic streptococcus in pure culture. Direct blood cultures negative. Autogenous vaccine prepared from the streptococci isolated ante-partum of the same case. Treatments with streptococcus autogenous vaccine begun on fifth day post-partum. A mixed colon and strepto vaccine given on eleventh day post-partum on account of a colon cystitis which developed. This mixed vaccine was continued daily to the seventeenth day. Then strepto vaccine was administered every third day until twenty-third day.

During third and fourth week there was a gradual development of an abscess in the right inguinal gland which was opened during fourth week. The pus showed culturally a non-hæmolytic streptococcus in pure growth. The patient gradually improved and was discharged well, six weeks post-partum, with cultures from the vagina, cervix and bladder sterile. The opsonic index went up to 1.27 on the fourth week.

The dose of the streptococcus vaccine when given alone was 40 to 75 million; when in combination with colon the dose of the strepto was 30 million and the colon 25 to 50 million.

This case, as well as the one outside of our series, mentioned under the heading of direct blood cultures in the preceding article, is a good illustration of a fact recognized by one of us (Medalia) that vaccine treatment tends to localize the infectious process. A local infection will be localized in a smaller area by vaccines and a general infection will be localized and brought to a head in some one part of the body.

CASE 2 (2409). This case had no streptococci ante-partum but had a non-hæmolytic streptococcus post-partum. The cultures were taken on the fourth day post-partum. Temperature began on third day with symptoms of retained material (lochia with odor), curettage on fifth day; temperature instead of going down following curettage kept on going higher than before (see chart). Autogenous vaccine administered on eleventh day. Temperature went down to 96.8 on thirteenth day (negative phase?), two days later normal. Recovered and discharged well on seventeenth day. Vaccines were kept up from the eleventh to seventeenth day. Autogenous streptococcus vaccine given twice daily in doses of 30 million each.

This case points, first, to the virulence of the non-hæmolytic streptococcus; second, where such an infection is present local disturbances (especially curettage) with their

accompanying traumatism should be undertaken with caution. In this particular case curettage had to be done on account of the retained material, even in the presence of virulent organisms. It is, of course, understood that without the retained material the better treatment would be to have left the patient undisturbed. Where a curettage is indicated, immunizing doses of vaccine should be given in order to raise the patient's resistance, before the curettage is undertaken. The immunizing effects of the vaccine are by this time well established, as evidence typhoid immunization.

CASE 3 (2391). This case had a non-hæmolytic streptococcus ante-partum; normal delivery. Second degree perineal tear; complained of sore throat third day; cultures were taken from the uterus third day post-partum, found pure growth of hæmolytic strepto; abdomen tender. Vaccine treatment begun seventh day post-partum and continued until twelfth day. Temperature third to sixth day above 100° F. Normal on tenth day. Discharged well on fourteenth day. First index at time of cultures .54.

Subsequent history (six months later) showed a large fibroid attached to fundus of uterus completely adherent to peritoneum over the bladder by recent adhesions. This suggests that during lying-in period, the distention meant a peritonitis, probably caused by infection from the uterus.

CASE 4 (2402). Albuminuria ante-partum and other symptoms of renal toxæmia. Confined to bed one week during pregnancy. Ante-partum cultures showed a non-hæmolytic streptococcus.

December 13th, confined, normal, slight tear, repaired. December 17th, direct blood cultures negative. Lochial cultures showed non-hæmolytic streptococci; some odor to discharge. December 17th, first elevation in temperature, 103° F. Irregular temperature from 17th to 22d; average elevation 102° F. At this time, December 22d, temperature was 105° F.; odor still present; marked tenderness in fundus.

Intrauterine douche given and autogenous vaccine begun. Average dose 30 million of streptococci given daily up to January 14th. Temperature gradually dropped with some exacerbation at irregular intervals. Discharged well January 14th. Only other treatment was hot sterile intrauterine douche. The delay in administering the autogenous vaccine was due to lack of proper facilities in transportation of cultures. The proper way would have been to start with a polyvalent stock vaccine until the autogenous was obtained.

CASE 5 (2242). This patient had a non-hæmolytic streptococcus in discharge post-partum; lochia odorous; temperature third day 102.5°. The next day after appearance of temperature she was given an autogenous streptococcus vaccine. Opsonic index .55. The low index in this case influenced administration of the vaccine. Discharged well, fourteenth day post-partum. Vaccine kept up from fourth to seventh day.

CASE 6 (2365). Ante-partum bacteriological examination of this case, October 16th, showed pneumococcus present in vaginal secretion. October 17th, direct blood cultures sterile; October 24th, confined. Borderline Cæsarean pelvis; high forceps; second degree perineal tear. Sutured. October 26th area about sutures covered with a green slough. Stitches removed and area curetted. Stitches reinserted. Pneumococcus autogenous vaccine administered and continued daily (50 million) until November 4th. Perineum healed as by 1st intention. Pneumococcus opsonic index ante-partum 1.00, post-partum .59, went up to .96.

This case is a remarkable illustration of the liability to infection of a patient who has in her genital tract any of the pathogenic organisms. The question of self-infection seems to us to be further emphasized by this case. Here is a case in whom we find pneumococcus in the vaginal secretion ante-partum with a normal opsonic index. If delivery were normal, no wounded surface produced, everything might have passed off without sequelæ. On the other hand, an unavoidable wound is caused; the patient's resistance being lowered from delivery, the bacteria immediately take the upper hand. Fortunately for this patient, the pneumococcus as a rule produces localized infections and not general septicæmias. We can readily see, however, to what extent is the danger of autogenous infection when we consider the large number of cases that have streptococcus in their vaginal secretions ante-partum and post-partum.

Autogenous vaccines were used in all the cases, prepared in some from the cultures obtained ante-partum. Polyvalent stock vaccine should have been used while waiting for the autogenous vaccine to be prepared.

The method of preparation of the vaccines is briefly as follows:

It consists in cultivating the bacteria in pure culture for twenty-four hours, washing off the growth with sterile salt solution, killing the bacterial suspension in a hermetically sealed test tube submerged in water and kept in an incubator at a temperature 56° C. for one hour. The vaccine is demonstrated

to be sterile by means of inoculating a culture tube with part of it, and incubated for twenty-four hours. Standardization is best accomplished by mixing equal volumes of the vaccine and fresh blood, smearing the mixture on a slide, staining it and counting the number of corpuscles and bacteria present in each field. The number of bacteria, say in 30 to 40 fields, is divided by the number of red corpuscles, and the result is multiplied by 5,000,000,000, which gives us the number of bacteria per ccm. present in the suspension. This is diluted according to the desired amount per cc., the diluent being sterile normal saline containing one quarter of one per cent carbolic.

Since all the cases under observation were acute and vaccine had to be administered daily or even bi-daily, we discontinued the opsonic index as a guide to treatment. The clinical response to the inoculations was therefore used as a guide.

A minimum dose was used for the first inoculation. The dose was increased at the second inoculation according to the local reaction. If the reaction at the point of the inoculation was marked (marked swelling and tenderness) the dose was slightly decreased rather than increased. We reinoculated only after the local reaction of the previous injection had partially or totally subsided. In case no local reaction appeared within 8 to 12 hours another injection of the same dose or a slightly larger dose was given.

SUMMARY

We shall refrain from drawing any definite conclusions from the foregoing. We wish to emphasize, however, the following points:

The opsonic index, according to the results obtained in this series may be considered of value in determining the patient's resistance and the possible gravity of the infection when present. But it cannot be said to determine whether a given streptococcus is virulent or avirulent. It is therefore of value from a clinical standpoint only. The actual labor involved in the opsonic test, also the great possibility of error, even in the hands of the most experienced, would rule it out from being applied as a routine test in daily practice. It is of value in research work.

Vaccine treatment, according to this research, is of value in puerperal sepsis and is worthy of further trial in similar cases.

RESULTS OF EXPERIMENTS ON KIDNEYS WITH ESPECIAL REFERENCE TO DECAPSULATION AND ESTABLISHMENT OF COLLATERAL CIRCULATION

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As there seems to be some diversity of opinion on the subject of the behavior of the kidney after decapsulation, the writer undertook some experiments on cats and dogs with the following results:

The first series was with cats.

January 9, 1912. Gray cat. Ether anæsthetic. Left kidney exposed through left abdominal incision. Capsule stripped off and kidney wrapped in omentum.

January 10th. Cat's condition good.

January 16th. Middle abdominal incision. Kidney found firmly encapsulated in omentum. Artery tied off.

January 17th. Cat died. Post-mortem showed extensive tuberculosis of the intestinal tract. Some involvement of the lungs. Kidney normal.

January 10, 1912. Black and white cat No. 1. Ether anæsthesia. Left abdominal incision. Left kidney exposed. Capsule stripped and kidney wrapped in the omentum.

January 17th. Middle abdominal incision. Kidney firmly encapsulated in omentum. Arteries tied off.

Died January 20th.

Post-mortem. Extensive tuberculosis of intestinal tract.

January 23, 1912. Black and white cat No. 2. Ether anæsthetic. Middle abdominal incision. Left kidney exposed. Capsule stripped and kidney wrapped in two layers of omentum.

February 14th. Lateral incision. Kidneys found firmly adherent to the omentum. Renal artery tied off.

February 16th. Cat's condition good.

February 23d. Cat killed by illuminating gas.

Post-mortem normal. Left kidney, new capsule densely adherent. Whole organ slightly enlarged. Kidney normal.

January 24, 1912. Black cat. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 14th. Lateral incision. Kidneys found firmly adherent to the omentum. Renal artery tied off.

February 23d. Killed by gas.

Post-mortem. New capsule firmly adherent. Kidney enlarged. Ureter patulous. Macroscopically normal.

January 30, 1912. Gray cat No. 2. Medium incision. Capsule stripped and kidney wrapped in three folds of omentum.

February 10th. Lateral incision. Omentum firmly adherent. Renal vessels tied.

February 22d. Cat killed by illuminating gas.

Post-mortem. Kidney firmly encapsulated. Ureter patulous. Kidney much enlarged.

January 31, 1912. Black and white cat No. 3. Medium incision. Left kidney stripped and wrapped in two folds of omentum.

February 10th. Lateral incision. Omentum firmly adherent. Renal vessels tied.

February 28th. Killed by gas.

Post-mortem. Kidney firmly encapsulated. Kidney *much* enlarged. Ureter patulous. Right kidney in this cat was cystic. Bladder was full of normal urine.

January 31, 1912. Gray cat No. 3. Medium incision. Left kidney stripped and wrapped in two folds of omentum.

February 12th. Left lateral incision. Kidney well adherent. Renal blood-vessels tied.

February 22d. Cat killed by gas.

Post-mortem. General condition normal. Left kidney large. Collateral circulation firmly established. Ureter patulous.

February 1, 1912. Gray cat No. 4. Medium incision. Capsule stripped and kidney wrapped in two layers of omentum.

February 12th. Left lateral incision. Renal vessels tied.

February 22d. Cat killed by gas.

Post-mortem. Generally normal. Kidney well encapsulated. Ureter patulous and good collateral circulation.

SERIES 2

February 5, 1912. Large white dog. Dog A. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 12th. Left lateral incision. Kidney well encapsulated. Renal vessels tied.

February 22d. Dog killed by gas.

Post-mortem. Collateral circulation well established. Kidney large. Ureter patulous.

February 5, 1912. Small white dog. Dog B. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 12th. Left lateral incision. Kidney adherent to new capsule. Vessels tied.

February 22d. Dog killed by gas.

Post-mortem. Ureter patulous. Kidney large. Circulation good.

February 6, 1912. Medium white dog. Dog C. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 12th. Left lateral incision. Kidney well adherent to omentum. Vessels tied.

February 22d. Killed by gas.

Post-mortem. Kidney large. Ureter patulous. Circulation established.

February 6, 1912. Medium white dog. Dog D. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 12th. Left lateral incision. Vessels tied.

February 22d. Killed by gas.

Post-mortem. Large kidney. Ureter patulous. Good circulation.

February 7, 1912. White dog. Dog E. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 14th. Left lateral incision. Kidney and omentum adherent. Vessels tied.

February 22d. Killed by gas.

Post-mortem. Circulation firmly established. Large kidney. Ureter patulous.

February 7, 1912. White dog. Dog F. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 14th. Left lateral incision. Vessels tied.

February 22d. Killed by gas.

Post-mortem. Large well nourished kidney. Ureter patulous.

February 8, 1912. White dog. Dog G. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 14th. Left lateral incision. Vessels tied.

February 22d. Killed by gas.

Post-mortem. Large kidney well encapsulated. Blood vessels well formed. Ureter patulous.

February 8, 1912. White dog. Dog H. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 14th. Left lateral incision. Kidney adherent to omentum. Vessels tied.

February 22d. Killed by gas.

Post-mortem. Large kidney. Good circulation. Patulous ureter.

February 9, 1912. Brown dog. Dog 1. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 14th. (5 days after first operation) left lateral incision. Kidney adherent to omentum. Vessels tied.

February 22d. Killed by gas.

Post-mortem. Large kidney. More firmly adherent than on February 14th. Circulation good. Ureter patulous.

February 19, 1912. Large brown dog. Dog J. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 22d. Dog's condition good.

February 28th. Ligature on the omentum had slipped so that the kidney was not adherent to the omentum. The kidney was re-wrapped in the omentum and vessels were tied off. Dog died on the 4th of March with infection of the pelvis of the kidney.

February 19, 1912. Large gordon setter, mongrel. Dog K. Medium incision. Capsule stripped and kidney wrapped in two folds of omentum.

February 22d. Dog's condition good.

March 8th. Dog killed by gas and left kidney was injected.

Macroscopically and microscopically the new blood-vessels showed extending well into the kidney.

February 19, 1912. Large gordon setter, mongrel. Dog L. February 1, 1912. Medium incision. Capsule stripped and left kidney wrapped in two folds of omentum.

February 22d. Dog's condition was good.

February 28th. Lateral incision was made. Renal vessels were tied off.

March 5th. Right nephrectomy.

March 8th. Dog killed by gas.

Post-mortem. Left kidney enlarged. Bladder full of normal urine.

February 19, 1912. Large gordon setter, mongrel. Dog M. Medium incision. Capsule stripped and left kidney wrapped in two folds of omentum.

February 22d. Dog's condition was good.

February 28th. Lateral incision was made, and renal arteries were tied off.

March 5th. Right nephrectomy.

March 8th. Dog killed by gas.

Post-mortem. Left kidney enlarged. Normal urine in bladder.

As will be seen from the foregoing, the following facts have been established:

1. That the kidney increased in size upon decapsulation.

2. That wrapping the decapsulated kidney in the omentum is immediately successful in forming a new capsule.

3. That collateral circulation is established at the end of ten days.

4. That collateral circulation is sufficient to allow the kidney to functionate properly when the renal blood-vessels are tied off.

5. That the kidney remains much enlarged when the capsule is removed.

6. That forming a new capsule from the omentum prevents adhesions between the kidney and the surrounding soft parts and increases blood supply.

The literature is interesting and varied.

Alessandri, in 1900, found that when the renal vein was ligated the kidney still maintained its function but somewhat lessened.

When the renal artery was tied there was such dimunition in function that the animal could not live. When the artery and vein were both tied there was a slow necrosis and reparation of the parenchyma by connective tissue.

Bobroff, of Moscow, found that when the vessels are ligated the organ does not necrose, but function was impaired.

Cohn, of Breslau, found that when he tied the artery in rabbits and dogs the spermatic and suprarenal arteries supplied the organ.

Talma tied the renal artery with the result that the connective tissue developed and this was followed by atrophy.

Maron reported necrosis after occlusion of the branch of the renal artery in a rabbit.

Buchwald and Lettus found that while there is no inflammatory process when the vessels are tied, the organ fully atrophies.

Litten ligated vein and found a compensatory circulation established. When both vessels are tied there is atrophy of kidneys.

Giani ligated the renal artery in dogs. Operation was followed by albuminuria and hæmaturia.

He concludes that the operation leads to grave circulatory disturbances; to degeneration and necrosis.

Ehrhardt experimented on six cats and after decapsulating the kidney could not demonstrate any noteworthy anastomosis between the kidney blood-vessels and the connective tissue.

Auzillotti found that when the kidney had previously been decapsulated the amount of

necrosis determined by the ligature of the artery was less. He writes that the compensatory circulation provoked by decapsulation does not seem to alleviate disturbances caused by ligature.

Parlavecchio decapsulated kidneys and invested them with omentum and concluded that the lesions of the kidneys were less grave and reparation more prompt and efficient.

Porcile tied a branch of the renal artery after decapsulation and after investment with omentum. Kidneys treated thus reacted more promptly to regenerative changes.

Claude saw adhesions of the decapsulated kidney to the omentum in which the newly formed blood-vessels communicated with the small vessels of the parenchyma.

Muller experimented on six dogs with decapsulation and investment with omentum. He killed the dogs in fourteen days and after injecting blood-vessels demonstrated them with the X-ray.

The adhesions of the omentum and the new blood-vessel supply were well marked.

In three cases of nephritis in human beings the foregoing procedure diminished the albumen and improved the general condition.

Martini arrived at the conclusion with reference to experimental decapsulation in dogs, that the new capsule is formed chiefly by the growth of connective tissue and is not of uniform thickness but is everywhere thicker than the normal when the kidney is surrounded by omentum. No evidence of shrinking is seen in the new capsule and much vascularization is well conserved. By injecting after death the new blood-vessels are seen to extend well into the substance of the kidney.

The new collateral blood supply is much richer than the original and the new capsule more vascular. A dog can live after circulation, following decapsulation, has been established even though the other kidney be extirpated and the vein of the remaining kidney is ligated.

Jungan reports tying both vessels in two dogs. This was followed in twenty-four hours by necrosis of all epithelium and he comes to the following conclusions: No restitution of kidney after ligature. Processes of regeneration missing owing to initial destruction of tissue. Kidney finally undergoes fibrocalcification.

Ignatowsky concludes that the kidney whose artery or vein is tied degenerates and atrophies.

Taddi decapsulated the kidney and invested it with omentum with the following results. New fibrous capsule poor in vessels and thicker than the former was found, and upon tying the renal artery or vein, thirty-seven to forty days after decapsulation, five of his eight dogs died spontaneously. No compensatory circulation was noted after tying the artery. He states that the damage is irreparable and that the compensatory circulation is no greater than when the omentum is not used to surround the kidney.

Florshen did a nephrotomy on cats and implanted the peripheral vein of the omentum in the wound in the kidney and covered both kidneys with omentum. Out of nine cats operated on eight died in from six hours to five days. In the remaining cat the arteries were tied fourteen days after the implantation. Cat died in eight hours. The author concludes that while an arterial anastomosis between the omentum and kidney does occur it does not compensate for the blood supply via the renal artery.

Liek contends that the idea of surrounding the kidney with omentum originated with Gelpke years ago and was tried by Tuffier in 1890.

Baker, in 1904, proposed decapsulation with investment by omentum. Gelpke then operated on three nephritics in this manner with a betterment of their condition. Baker operated on one nephritic who died.

Girgaloff experimented on cats. Two to eight weeks after decapsulation and investment with omentum, animals were killed and aortas were injected, the injected material penetrated well within the vessels of the kidneys.

MacNider concludes as a result of occlusion of one branch of the renal artery that ligature of the posterior branch of the renal artery leads to a necrosis of the greater portion of the cortex and that an imperfect anastomosis of the two vascular zones of the kidneys is possible.

Katzenstein imbedded one of the kidneys of a dog in the abdominal muscles and reduced the circulation in the renal artery. The collateral circulation was well demonstrated by injection.

Kawashima, in experiments where renal arteries were tied and kidneys imbedded in abdominal muscles, found kidney function normal.

Cholzow treated a number of cases of nephritis by decapsulation and investment in omentum with good results.

STERILITY IN THE FEMALE WITHOUT MARKED GROSS PATHOLOGY

And the Report of Thirty-five Cases

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A MARRIAGE may be considered sterile at the expiration of two years, provided no means have been employed to prevent conception. Some authorities, like McDonald (1), and Kirsh and Kleinwachter (2), extended the period to three years or even longer. But in the experience of such men as Hofmeier (3), Chrobak (4), and V. Rosthorn (5), two years is sufficient, in the ordinary case. Ansell (6) records that among 6,035 fruitful marriages, 88.1 per cent bore children within the first two years, the average first child being born in sixteen months. The following table shows the interval between marriages and the births of first children in this series.

Year after marriage	Number of first children
1	3,159
2	2,163
3	421
4	137
5	69
6	26
7	21
8	11
9	7
10	7
11	5
12	4
13	3
14	2

Interesting and instructive as these statistics may be, their practical value is greatly nullified by the fact that those cases in which artificial means to prevent conception have been employed are necessarily included among them. The dislike of having children during the first year of married life is so widespread that preventive measures are very frequently employed for the first few months after marriage. Furthermore, the 88.1 per cent includes only those women who have borne children within two years after marriage; those who have aborted, miscarried, or who are pregnant at the expiration of this period are not included in this proportion. If, therefore, it were possible to exclude all cases in which preventive measures had been employed and all who had conceived within this period, the percentage would probably be considerably higher. Every practitioner of experience can recall cases in which pregnancy has occurred for the first time late in married life, but these instances are comparatively rare and it is doubtful if in the majority of cases, in which two years have passed, more harm is not done by the loss of time by waiting longer than this period, than is incurred by more active measures.

Responsibility of the male. According to Rongy (7), the male partner is responsible for 50 per cent of the sterile marriages. Gross (8) places this figure at 16 per cent; Pincus (13), at 24.4 per cent (series of 488 cases); Torkel (11), 26 per cent; Kehrer (9), at 31.5 per cent; Lier and Ascher (10), at 40.1 per cent (series of 424 cases); Sanger (12), at 50 per cent; while other authorities place the proportion at from 25 per cent to 33 per cent. Be this proportion what it may, it is certainly accountable for a definite number of the child-

less unions. Among the laity, it is a common belief that if the man is potent, he is therefore not sterile and for this reason women are frequently considered barren when the real fault lies at the door of the male partner. Certainly no woman should be pronounced sterile until the fecundity of her husband has been proven, and it is of even greater importance that she should not be subjected to the risk of an operation, however trivial, until this point has been positively ascertained.

Varieties of sterility. Sterility may be primary or acquired, absolute or relative. Primary sterility may be defined as the variety in which congenital defects are present which prevent conception, while an example of acquired is found in the sterility of gonorrhœa. Absolute sterility is that type in which conception cannot take place, while examples of relative sterility may be found among those women who are barren with one husband but who are fertile with another. Acyesis is so frequent and is produced by such a variety of general and local conditions, that it would be manifestly impossible to treat the entire subject in a paper of this character. In many cases, the cause of the sterility is obvious; such are not included in this study, the intention being to deal only with those cases in which no marked gross etiological factor can be easily demonstrated. Cases are frequently referred to the gynecologist with the statement that the patient is normal, that the uterus and appendages are movable, and are of nearly normal size, that the vagina presents no very marked abnormality. These are the variety of cases which are to be considered in this study.

Frequency of sterility. Sterility, even of this type, is often met with. The frequency of sterility varies quite markedly in different classes. As a general rule, the percentage of sterility increases with the degree of civilization. Fertility is more prevalent among the lower and middle classes than among the rich. The absence of children, however, in a certain class of society can hardly be entirely attributed to sterility. Nevertheless, even if those cases in which preventive measures have been employed are excluded, actual sterility is probably slightly more frequent among such than among the populace. Sterility is probably increasing in the United States, especially among native-born women. In 1900, twenty per cent of native marriages were unfruitful, while among the foreign element this proportion was reduced to thirteen per cent. Engleman (14) states that, with the exception of France, there is more sterility in the United States than in any other country in the world. This author found that among college graduates the proportion was 1 to 3.5 per cent. In the British peerage, Ansell (6) found one in every 6.9 marriages sterile. Spencer Wells, Marion Sims, Rongy (7) place the proportion at 1 to 8. Simpson states that it is 1 to 8.5. During the last twelve years, over one hundred women have applied to the gynecological department of the University of Pennsylvania for treatment of sterility, and many more have been seen in which this was a pronounced symptom.

Causes of sterility. These may be divided into local and general causes. Under the heading of local causes of sterility should be placed congenital failure of development of some portion of the genital tract; stenosis of the cervical canal in otherwise normal uteri, antiflexion of the uterus; cervicitis; endometritis; salpingitis; in which the tubes are small, flaccid and in which the lesion cannot be detected without an anæsthetic; vaginismus and spasm of the uterine ligaments. Among the general causes are extremes of life, anæmia, obesity, wasting diseases, acromegalia, tertiary syphilis, exophthalmic goitre, chronic alcoholism, certain drugs, the X-ray, and depressing factors in general. Consanguinity, masturbation, dyspareunia, great mental depression, sexual incompatibility, climatic conditions, and, in some, possibly a reversion to the seasonable fertility of the lower animals are usually mentioned in this category. Exactly how important a part these bear in the actual prevention of conception, is difficult to estimate.

LOCAL CAUSES

Congenital malformation of the genital tract. This is the most frequent cause of sterility in women. Any part of the genital tract may be at fault, and not infrequently a number of organs are concomitantly defective. The

uterus is probably more often at fault than any other one organ. Bab (15) and Bumm (16) state that congenital failure of development of this organ is accountable for 66 per cent of all cases of sterility occurring in women. Schultz (18) is of a similar opinion. The infantile type of uterus is the variety most often encountered. This consists of a small uterine body which is often accompanied by a long tapiroid cervix, the external os of which is markedly contracted and commonly referred to as the pin-point os. The cervical canal in these cases is drawn out and filled with a plug of tenacious mucus. Stenosis of the cervical canal is not infrequent. This may be general throughout the cervical canal, but is usually most marked at, or slightly below, the internal os. The cervix, as a rule, extends deeply into the vagina. Pozzi (17) has directed attention to a condition sometimes found accompanying this type of cervix in which the cervical canal is dilated and assumes the shape of a barrel. In these cases, both the internal and external os are tightly contracted, the diameter of the canal is much increased and the lumen filled with mucus. These coniform cervices are often the seat of a mild grade of infection, the infection being analogous to the balanitis sometimes observed accompanying phimosis in small boys. Uterus septus, uterus cordiformis, and other forms of hypoplastic uteri are occasionally met with but are much less frequent than the infantile variety. These congenitally defective uteri sometimes partially maintain the high position in the pelvis which is present in childhood and thus add an additional factor to the difficulty of impregnation. Antiflexion, and congenital narrowing of the upper portion of the vagina, is often present in conjunction with hypoplasia of the uterus, and, in rare instances, may occur independently. As a result of this condition, the vaginal lake is shallow or entirely obliterated, and the retention of the seminal discharges in the ordinary prone position is defective. Runge (27) lays especial emphasis on this point. This author examined the secretion from various areas in the vagina from a series of women in whom vaginal malformations were present. In most of these patients the condition was a simple narrowing of the upper portion of the vagina. The examinations were made at varying intervals after coitus. Control examinations in a series of normal women were carried out. Runge found that the number of spermatozoa, in a given amount of secretion from women in whom the vagina was normal, was much higher than from those in whom congenital narrowing was present. These investigations confirm the theory of the importance of taking into consideration the depth of the vaginal lake. Mayer and others (23) state that certain women have the power of ejecting the semen from the vagina by a spasmodic action, which may be either voluntary or involuntary.

Reynolds (25) has directed attention to the frequency of congenital shortening of the anterior vaginal wall in cases of sterility and dysmenorrhœa and believes that the pulling forward of the cervix and consequent antiflexion is due to this defect. Failure of development of the Fallopian tubes or ovaries can rarely be detected unless the abdomen is opened. The long, tortuous infantile tube, in which there is little distinction between the isthmus and ampulla, is perhaps occasionally a factor as the production of sterility. These abnormalities are frequently accompanied by long, flat undeveloped ovaries. Disturbances of the various internal secretions of the hypophysis, thyroid, adrenals, etc., are often associated with hypoplasia of the uterus and other congenital defects of the genital tract.

Stenosis of the cervical canal. Even in normally developed uteri, there may be a contraction in some part of the cervical canal. This is most frequently present at the internal os, although it may be situated in any portion of the canal. When not of congenital origin, this condition may be the result of a mild grade of inflammation. The author has seen one case in which an unusually large and prominent cystic Nabothian follicle bulged into the cervical canal and almost obliterated it.

Antiflexion of uterus. This is supposed to be a frequent etiological factor in the production of sterility and dysmenorrhœa, and is doubtless accountable for a certain proportion

of cases. From the clinical study of the cases forming the basis for this paper, and from the previously reported observation of a large group of patients suffering from dysmenorrhœa, the writer (19) is led to the conclusion that antiflexion alone is rarely the cause of sterility. Although it is frequently present in conjunction with hypoplasia or stenosis, it seems probable that in most cases extreme antiflexion is a sign of maldevelopment rather than a mere postural disorder. With the hope of perhaps ascertaining exactly what part antiflexion plays in actually obstructing the cervical canal the following experiments were performed. Water was thickened with starch to, as nearly as possible, the consistency of blood. The solution was colored with methylene blue. The endometrial cavity of a freshly removed uterus was then injected by using an ordinary intrauterine syringe with half an ounce of the above solution, the uterus being held with the cervix upwards during this procedure. The cervix was then flexed upon the body of the uterus to a little less than a right angle, care being taken not to compress the body of the uterus. The position of the uterus was then reversed, the long axis being directed downwards and the cervix anteriorly. The fluid immediately escaped from the endometrial cavity, showing that the flexion did not obstruct the canal. Larger and smaller amounts of fluid were experimented with, with the same result. Even when the cervix was kept flexed very forcibly in an acute angle to the body of the uterus, the fluid escaped and it was only with the utmost difficulty that half an ounce of the fluid could be maintained in the uterine cavity, and even then if slight compression was made over the body of the uterus, the fluid immediately gushed out. Eight different uteri were employed in these tests, all of which had been removed by panhysterectomy. It should be remembered in considering these experiments that none of these uteri were removed from patients suffering from obstructive dysmenorrhœa and that, furthermore, the uterus, after its removal from the body, becomes much more flaccid and doubtless the circular muscular fibres of the cervix relax, making the escape of the fluid from the uterine cavity, under the above conditions, more likely. Also four of the uteri were from multiparous patients. Nevertheless, even taking these facts into consideration, the ease with which the solution escaped, even when the cervical canal was very markedly flexed, was most striking.

It has been shown by recent investigations (19 and 20) that at each menstrual period, the entire endometrium, including that of the cervical canal, undergoes a definite cycle which is similar in a general way to the changes produced in early pregnancy. Thus, in the corporeal portion of the uterus, the endometrium resolves itself into two distinct layers analagous to the compact and spongy layers found in pregnancy, the stroma cells take on changes similar to the decidua, the cervix becomes softened, the canal more dilatable and the fibrous tissues of the cervix relax. Conception usually occurs shortly after a menstrual period, at which time the cervix is still softened and the canal widely patulous. Even in the intermenstrual period, it is unusual to encounter a cervix which will not admit a sound. If those cases in which there is apparent obstruction due to flexion, are carefully examined, it will often be found that the sound is prevented from entering the uterine cavity by a flexion in the canal or is caught in the arbor vitæ, and that the flexion rarely actually shuts off the canal. Even in extreme cases of stenosis or flexion it seems probable that the lumen of the cervical canal is seldom as small as that of the isthmus and intramural portion of the Fallopian tube. It is generally accepted that the spermatozoa usually meets the ovum in the tube, probably in the ampulla; to arrive at which point it must necessarily travel through this normally narrow part of the tube. This seems to prove that the spermatozoa will, under proper conditions, penetrate an extremely contracted canal.

Cervicitis. A mild cervicitis is not infrequently present in nulliparous women, and this may, in some cases, be an etiological factor in the production of sterility. Excluding cases of gonorrhœal cervicitis, inflammation of the cervical mucosa is not infrequent. The cervix is one of the locations most frequently

attacked by the gonococci, but as inflammation of this type is usually accompanied by urethral or Bartholian lesions, their detection, provided proper methods are instigated, is not usually difficult, and it is not, therefore, within the scope of this paper to deal with them. Gonorrhœa of the genital tract is undoubtedly the most frequent cause of sterility, but in many cases this infection is associated with easily demonstrable gross lesions, such as advanced pelvic inflammatory disease.

Corporeal endometritis. It was formerly believed that corporeal endometritis was often the cause of sterility. It is now recognized that chronic endometritis, unless accompanied by tubal or other lesions, is a comparatively rare disease. The cases of endometritis which may cause sterility are usually associated with gonorrhœal cervicitis or urethritis. Hypoplastic or fungoid endometritis is occasionally encountered and usually produces sterility. Fonss (22) has seen this condition five times among one hundred and three cases of sterility.

Salpingitis and oöphoritis. In the great majority of cases, inflammatory lesions of the appendages can be easily detected by palpation. Occasionally, however, cases are encountered in which this is impossible without an anæsthetic, and a search for such lesions, together with an examination of the external genitalia, urethra, and cervix for possible gonorrhœa, should always be instigated. Sanger (23), Marx (24), and others have observed that a gonorrhœal vulvovaginitis of childhood may persist and later extend to the uterus and tubes and in this manner produce pelvic lesions in young women. This is of more importance in studying cases of dysmenorrhœa than sterility, as these patients are often unmarried. Gonorrhœal vulvovaginitis is extremely prevalent in childhood and its chronicity is one of its chief characteristics. This mode of infection, although extremely rare among married women may, however, be considered in certain rare instances.

Vaginismus. Vaginismus may cause sterility, but this symptom is generally brought about by some demonstrable lesion or occurs in neurasthenic women and the history of vaginal spasm is obtainable in all cases. The diagnosis is therefore not difficult.

Spasm of the uterine ligaments. Reynolds (25) has recently pointed out that a painful spasm may occur in the ligaments of the uterus and by its action produce dysmenorrhœa or even sterility. The areas most frequently affected are the uterosacral ligament, the base and upper edge of the broad ligament, and the vesicouterine ligaments. The spasm may be detected by vaginal touch and will disappear under the influence of a general anæsthetic. Reynolds believes that this condition is directly due to a mild grade endocervicitis and is analogous to the rigidity of the rectus muscle encountered in cases of appendicitis. Dickenson (26) calls attention to the fact that spasm of the uterine ligaments, especially the uterosacral and broad, is often caused by a proctitis. The rectum should therefore be examined in all such cases.

General causes. The age of the patient is also of importance in considering the question of sterility. During either extreme of the sexual life, conception is less likely to occur. According to statistics, the most fertile period is between twenty-five to thirty-seven years of age. These figures are, however, misleading as far as the minimum is concerned, as they depend largely upon the age at which marriage occurs. Various general causes must also be considered in studying the question of sterility. Anæmia, wasting diseases, acromegalia, tertiary syphilis, exophthalmic goitre, chronic alcoholism, certain drugs such as ergot, lead, opium, heroin, and the narcotics in general, the X-ray, and depressing factors such as insufficient food, malnutrition, sedentary occupation, indoor life, or overwork will frequently prevent conception. Sterility is more common among the obese and not infrequently if the weight of these patients is reduced pregnancy will result. The mode of life is also an important factor in the consideration of this subject. Consanguinity, masturbation, dyspareunia, great mental depression, sexual incompatibility, climatic conditions, and, in some, possibly a reversion to the seasonable fertility of the lower animals, are usually mentioned in this category.

Diagnosis. In the accurate determination of the cause of the sterility lies the key to success in the treatment of this condition. The cases must be carefully and individually studied. In a certain proportion of cases, the diagnosis can only be arrived at by a process of exclusion, and in a few, notwithstanding the most painstaking study, no etiological factor can be discovered. The proportion of cases in which the cause of the sterility cannot be ascertained should be extremely small and bears a direct ratio to the skill of the attending physician. Sterility of cervical origin is nearly always accompanied by dysmenorrhœa and on this symptom alone, not infrequently, a moderately accurate prognosis can be based. The cases in which there is an obstruction in the cervical canal are the ones which are most favorable for treatment. These are nearly always associated with spasmotic dysmenorrhœa. The pain begins a few hours before the appearance of the flow, is intermittent or cramp-like in character, often resembling miniature labor pains, and is frequently temporarily relieved by the expulsion of a clot. The dysmenorrhœa generally disappears after the second day of the flow. Many cases suffer from a combination of obstructive and congestive dysmenorrhœa. In these, the predominance of the type of dysmenorrhœa is often an index to the prognosis of cure by operation. This is the variety of dysmenorrhœa which generally accompanies hypoplasia of the uterus. The menstrual flow is often scanty.

Treatment. The treatment necessarily depends upon the diagnosis. In the debilitated, general treatment such as improved hygiene, tonics, out-of-door exercise, restriction of indulgence in sexual intercourse to at least moderate bounds, is indicated. In the obese, diet and exercise are of the utmost importance. Even if the condition is found to be of local origin, it is of the greatest advantage to have the patient in the best possible physical condition before resorting to operative intervention. Watson and Campbell (28) have shown by their experiments on animals that a diet containing but little nitrogenous material is most conducive to conception. Numerous operations have been devised for the treatment of sterility and dysmenorrhœa of cervical or uterine origin, nearly all of which are based upon the principle of obtaining free dilatation and drainage of the cervical canal. Simple dilatation may be obtained by the use of sponge tents, the metranoikter, or with the ordinary Goodell dilator. Sponge tents are unsatisfactory in many ways. The metranoikter, although it may produce good dilatation, usually causes such pain that the instrument has to be removed before sufficient dilatation is attained. When using it, the exploration of the uterine cavity is impossible unless a second operation be performed. A simple stretching of the cervix by means of a Goodell-Ellinger dilator cures a certain proportion of cases, but is not as a rule permanent, as instanced by the fact that the dysmenorrhœa, which may be alleviated or even temporarily cured, generally returns within one to three months following the operation, and this despite the most thorough and painstaking dilatation. Pozzi (17) of France and Dudley of Chicago have both devised splitting operations upon the cervix. The former's stomatoplasty by commissural *evidement* consists in splitting the cervix laterally and suturing the cut surfaces transversely. After healing has taken place, the cervix more or less resembles an organ the seat of a well healed bilateral laceration such as is produced by childbirth. Dudley splits the posterior cervical lip and in some cases the anterior lip also. Bell[1] splits the anterior cervical lip up to the internal os, if necessary separating the bladder from the uterus. The operation is completed by stitches in the cut edges of the cervix and closure of the anterior vaginal fornix. All these operations should be preceded by a thorough dilatation and exploration of the uterine cavity. Both the Pozzi and Dudley operations completely eradicate any obstruction in the lower part of the cervical canal and also facilitate the treatment of this region. Pozzi cures twenty-five per cent of sterility by his operation, while Brickner (29) has recently reported twenty-seven per cent of cures in a series of forty-eight cases by the Dudley operation. Both these operations possess excellent features. The only criticism

[1] W. Blair Bell, *The Practitioner*, London, Feb., 1912, p. 219.

PESSARY FOR USE IN CASES OF DYSMENNORRHŒA OR STERILITY DUE TO CERVICAL STENOSIS

The special features of this pessary are the double groove, the absence of the ordinary broad occlusive base, the well marked bulb on the end which prevents the expulsion of the pessary and the flattening of the posterior surface of the bulb which forms a broad smooth base upon which the posterior uterine wall rests in cases in which flexion has been present.

possible is the question of thorough and permanent dilatation of the internal os, the point at which constriction is most often present. Wylie (30) and Carstens (31) have devised stem pessaries for the purpose of producing a permanent dilatation of the cervical canal. This mode of treatment has, in the author's hands, met with excellent results. The insertion of the pessary is preceded by a thorough dilatation of the cervix and exploration of the uterine cavity. The theoretical objection to this form of treatment is chiefly the dangers of infection, i. e., the possible production of an endometritis caused by infection from the cervix or vagina while the drain is being worn.

While the vagina is rarely the seat of pathological germs in the nullipara, it is often the habitat of numerous bacteria and is frequently far from being surgically clean. At a casual glance this type of treatment appears unsurgical. It has been claimed that the pessary, despite the grooves on its shaft, may act as a plug and not as a drain. Practical experience with these instruments has proven that the dangers have at least been greatly overestimated. Before performing a dilatation operation of any sort, the greatest care must be exercised to exclude the possibility of pelvic inflammatory disease or infection of the cervix, and this is especially true when the stem pessary is to be employed. No case should be subjected to operation which presents any evidence of gonorrhœa. The exits of Bartholin's glands, the urethra and the cervix must be carefully examined and if infection cannot be positively excluded, the operation should be deferred. A thorough pelvic examination should also be made, preferably under an anæsthetic. Neglect to ascertain the presence of pre-existing inflammatory disease accounts for the majority of the so-called post-operative infections which have been reported as following the use of the stem pessary in modern times. This form of treatment has now been employed for dysmenorrhœa or sterility of obstructive cervical origin, in the gynecological department of the University of Pennsylvania for the past four years without a single post-operative infection.

A time, about ten days before the expected menstrual period, should be selected for operation. Absolute asepsis should be carried out. The patient should be anæsthetized. A thorough dilatation extending over a period of fifteen minutes should first be performed. The amount of dilatation must be governed by the individual case. It should be remembered that a much greater dilatation is required in these cases than in the simple dilatation for curettage. After the dilatation, the entire uterine cavity should be carefully explored, not curetted, although one or two strips of mucosa may be removed for histological examination if it is thought advisable. The possible presence of a uterine polyp or a small submucous myoma must also be considered. These cases are not of inflammatory origin and curettage in the general sense of the term is not required. After the dilatation and exploration of the uterine cavity, the drain should be inserted, care being taken to select a drain of suitable size. The drain should reach to within about 1.5 cm. of the top of the endometrial cavity and is best stitched to the cervix, one catgut or silk suture on each side being employed. These sutures steady the drain, keep it in proper place and prevent the possibility of its coming out. The vagina may be lightly packed to steady the drain in its position. This gauze should be removed at the end of twenty-four hours and the patient kept in bed for five days. The drain is worn for six weeks and during this time the patients are kept under observation. Full baths are not permitted and douches are

prohibited. Marital relations may be resumed within seven days of the operation and pregnancy sometimes follows the first menstrual period despite the presence of the pessary. Coitus should not be too frequent, as overindulgence is a common cause of temporary sterility. During and for fifteen minutes or half an hour following coitus, the hips should be elevated on a hard pillow. Withdrawal should also be delayed following the act. Both these procedures are recommended for the purpose of preventing the premature escape of the seminal fluid from the vagina, and are to be especially recommended in those cases in which the vaginal lake is shallow. As the vaginal secretion is acid and spermatozoa are known to thrive best in alkaline medi, it is advisable after the drain has been removed to order a weakly alkaline douche to be taken a few hours before coition. The bowels should be regulated and the diet should contain but little nitrogenous material. Open-air exercise, regulated to the needs of the individual patient, is of great benefit. Improved hygiene and getting the patient in the best possible physical condition are not only of importance in inducing conception but are also of the greatest benefit during the ensuing pregnancy, should that result take place. The author has recently adopted a somewhat modified form of stem pessary which is shown in the accompanying illustration. A stem pessary possesses two distinct advantages over other methods of treatment in that it produces permanent dilatation and free drainage of the entire cervical canal and that by its presence it excites uterine contractions. The latter are of great benefit in hypoplastic uteri and by the promotion of uterine gymnastics tend to develop those small organs which are so frequently the cause of sterility and dysmenorrhœa. As will be seen in the appended report, some of our cases have conceived while the drain has been in place. This is further proof, if such were required, that these instruments are not occlusive. It would seem that their action is somewhat similar to that of a filiform bougie. It is of frequent occurrence to observe a stricture of the male urethra which is producing retention; in such cases, if a filiform can be passed, escape of the urine generally occurs around the instrument, the urethral mucosa apparently retracting from the foreign body. This, we believe, is somewhat analogous to the action of the stem pessary.

In dealing with cases in which it is suspected that the tubes are occluded or that infantile conditions of the adnexa are present, but in which carefully repeated examinations have been performed, it may be, in rare instances, justifiable to open the abdomen. Such cases are, however, of extremely rare occurrence and the operation should only be performed after every other means has been exhausted and even then only in selected cases. Under such circumstances the author would be inclined to extend the period of waiting from two to at least three years or even longer, as the possibility of operative cure is by no means as probable as when the pathology exists only in the uterus. Little can be done for infantile ovaries, and salpingostomy for either small, flaccid hydrosalpinx or operations for infantile tubes is not productive of especially favorable results as far as sterility is concerned.

Results. Of thirty-five cases, of which the chief anatomical defects have been in the cervix or uterus and all of which had been sterile for periods varying from two to twenty-eight years, thirteen conceived. One of these patients aborted at the end of the twelfth week, again became pregnant five months later and subsequently went to term. It has been impossible to follow the after history of five of the pregnant cases, so that we cannot state the final outcome of these gestations. Three are now under observation and give every indication of advancing normally to term. One of the successful cases [1] was a woman of fifty years of age who had been married twice and had previously had two dilatation operations, one during each marriage. Three of the patients presumably conceived while the drain was in situ. In many of our earlier cases the fecundity of the husband has not been proven, while seven of the cases which are here reported as failures have been operated upon less than one year,

[1] Report of a case of sterility in the aged, cured by the use of the Wylie drain. Charles C. Norris, J. Am. M. Ass., April 22, 1911.

so that the actual percentage of cures is probably higher than our figures would indicate. These thirty-five cases do not by any means represent all the cases of sterility which have been operated upon by this method in the gynecological department of the University of Pennsylvania Hospital. This series of cases does, however, include all the cases in which this means of treatment has been applied and in which the after histories have been obtainable. In other words, they are not selected cases and while the percentage of cures is remarkably high, the series is too small upon which to base definite conclusions.

CONCLUSIONS

1. One in every seven or eight marriages is sterile. About fifty to seventy-five per cent of these are due to sterility of the woman.

2. Sterility may be the result of a variety of causes, both local and general. The success of the treatment depends upon the correct diagnosis of the etiological factor present in each case.

3. Excluding gonorrhœa, the three most frequent local causes productive of sterility are hypoplasia of the uterus, constriction of the cervical canal or a mild grade of cervicitis.

4. The routine practice of subjecting all cases of sterility to some form of dilatation operation, often without even ascertaining if the woman be the partner in fault, cannot be too severely condemned.

5. When hypoplasia of the uterus, a constriction of the cervical canal, or antiflexion is present, the stem pessary offers an excellent means of treatment. It produces permanent dilatation, as proven by the fact that it cures more than eighty-six per cent of cases of expulsive dysmenorrhœa. The stem pessary tends to produce development in those cases of hypoplasia of the uterus and by the drainage secured, often cures, and in all cases facilitates the treatment of endocervicitis of non-gonorrheal origin. It also straightens out flexions. In the gynecological department of the Hospital of the University of Pennsylvania, this form of treatment has been successful in thirty-seven per cent of cases of sterility.

6. No ill effects have followed this form of treatment in any of the cases operated upon for either sterility or dysmenorrhœa. This now comprises a large series of cases. It is essential that gonorrhœa and the various forms of pelvic inflammatory disease be excluded.

In a previous paper "Dysmenorrhœa in nulliparous women without gross local pathological lesions and the report of seventy-three cases" (Charles C. Norris and E. P. Barnard [34], Dr. E. P. Barnard and the author reported the results obtained in the treatment of seventy-three cases of dysmenorrhœa. Owing to the close relationship existing between dysmenorrhœa and sterility, some of this material has been incorporated in the present work.

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DEPARTMENT OF TECHNIQUE

OBSERVATIONS ON THE USE OF INTRATRACHEAL ANÆSTHESIA IN EXPERIMENTAL WORK[1]

With a Description of a Simple and Inexpensive Apparatus

By ARTHUR B. EISENBREY, M. D., Philadelphia
Instructor in Surgery, University of Pennsylvania

MELTZER'S[2] method of performing artificial respiration and administering ether anæsthesia by intratracheal insufflation has been a distinctly valuable addition to surgery and one that has found wide acceptance. Many articles describing apparatus and reporting the satisfactory application of the method in surgical practice have appeared in the literature. Aside from its very definite and unique value in intrathoracic work, in operations about the head, face and neck, where it permits the surgeon to work in a practically unobstructed field, and in cases in which the patient is placed upon the operating table in such a position that normal respiration and the administration of the anæsthetic are interfered with, the method is apparently finding favor as a routine measure. Allowing as it does a very uniform and readily controlled amount of the anæsthetic and a perfect and even admixture of air, it conforms with all the advantages claimed for the "open-drop" method and in addition supplies a most effective means of applying artificial respiration without loss of time in case of need.

Repetitions of the few "accidents" that were reported when the method was first applied in surgical work have been reduced to a minimum by simplification of the apparatus and by the attachment of safety valves, so that with the more general appreciation of the principles underlying its application it may now be regarded as one of the safest and most satisfactory methods of maintaining surgical anæsthesia with ether.

The same advantages claimed for its use in clinical work apply also to its use in the experimental field both in animal surgery and in physiological manipulations. Those who have engaged in such work know the discouragement attending the not infrequent death of an animal from the anæsthetic in the course of operative or physiological procedures which often require hours for their completion and even days or weeks for their preparation. A good assistant, who is also a skilled and conscientious anæsthetist, is not always available. Even when such can be found his best efforts to maintain for hours at a time the very uniform degree of anæsthesia that is desirable in many physiological experiments, are too often unsuccessful. When intrathoracic work is done the difficulties are multiplied.

During the past year in the Department of Research Medicine of the University of Pennsylvania, we have used intratracheal anæsthesia with the utmost satisfaction. In nearly all operations on animals and in all physiological experiments it was the routine method, while for class work in an elective course in the experimental physiology of the cardiovascular system it undoubtedly prevented considerable untimely ether mortality in the animals used by the class.

Early last fall it was the writer's good fortune to have the temporary use, for experimental work, of an apparatus designed for clinical purposes. The greater ease of control of air pressure and of the amount of anæsthetic provided by the elaborate and expensive apparatus, as compared with the old arrangement of Wolff bottles and screw clamps, stimulated the writer to devise a simple apparatus for laboratory use embodying the desirable features of the clinical apparatus.

Simplicity, small cost, and ease of construction were important considerations and with the materials at hand in the laboratory and a few hours' work an apparatus that fully complies with all the requirements was constructed. It has since been in constant use.

A description of the apparatus and a report of

[2] Meltzer, S. J., and Auer, John. Continuous Respiration without Respiratory Movements. J. Exper. Med., 1909, xi, 622.

[1] From the John Herr Musser Department of Research Medicine, University of Pennsylvania, Philadelphia.

so that the actual percentage of cures is probably higher than our figures would indicate. These thirty-five cases do not by any means represent all the cases of sterility which have been operated upon by this method in the gynecological department of the University of Pennsylvania Hospital. This series of cases does, however, include all the cases in which this means of treatment has been applied and in which the after histories have been obtainable. In other words, they are not selected cases and while the percentage of cures is remarkably high, the series is too small upon which to base definite conclusions.

CONCLUSIONS

1. One in every seven or eight marriages is sterile. About fifty to seventy-five per cent of these are due to sterility of the woman.

2. Sterility may be the result of a variety of causes, both local and general. The success of the treatment depends upon the correct diagnosis of the etiological factor present in each case.

3. Excluding gonorrhœa, the three most frequent local causes productive of sterility are hypoplasia of the uterus, constriction of the cervical canal or a mild grade of cervicitis.

4. The routine practice of subjecting all cases of sterility to some form of dilatation operation, often without even ascertaining if the woman be the partner in fault, cannot be too severely condemned.

5. When hypoplasia of the uterus, a constriction of the cervical canal, or antiflexion is present, the stem pessary offers an excellent means of treatment. It produces permanent dilatation, as proven by the fact that it cures more than eighty-six per cent of cases of expulsive dysmenorrhœa. The stem pessary tends to produce development in those cases of hypoplasia of the uterus and by the drainage secured, often cures, and in all cases facilitates the treatment of endocervicitis of non-gonorrheal origin. It also straightens out flexions. In the gynecological department of the Hospital of the University of Pennsylvania, this form of treatment has been successful in thirty-seven per cent of cases of sterility.

6. No ill effects have followed this form of treatment in any of the cases operated upon for either sterility or dysmenorrhœa. This now comprises a large series of cases. It is essential that gonorrhœa and the various forms of pelvic inflammatory disease be excluded.

In a previous paper "Dysmenorrhœa in nulliparous women without gross local pathological lesions and the report of seventy-three cases" (Charles C. Norris and E. P. Barnard [34]. Dr. E. P. Barnard and the author reported the results obtained in the treatment of seventy-three cases of dysmenorrhœa. Owing to the close relationship existing between dysmenorrhœa and sterility, some of this material has been incorporated in the present work.

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some observations made in the course of its use during the past year forms the basis of this paper.

DESCRIPTION OF APPARATUS

The principles of intratracheal insufflation are too well known to require repetition at this time. Suffice it to say that the essential features of the apparatus consist (1) of a constant air supply, the pressure of which is under control, (2) a means of diverting all or any portion of the air through a receptacle containing ether and (3) a tube for conducting the mixture of air and ether vapor into the lower portion of the trachea. A means for measuring the pressure of the air-ether mixture is interposed between the apparatus and the animal or patient.

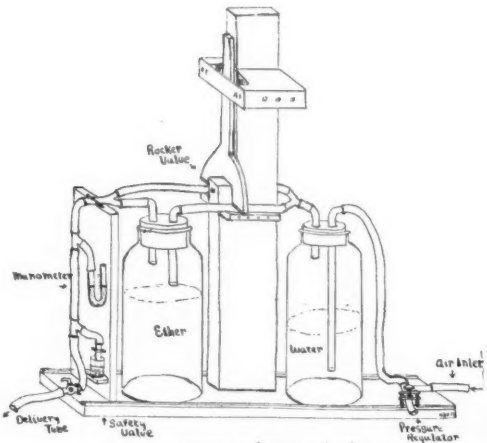
A foot bellows and pressure bottle, a small electrically driven blower, or compressed air piped from a central plant, may be used as a source of supply. The latter is, of course, the more desirable method, especially for class work or for experimental work when it is desired to run several experiments simultaneously.

Next to the cost of the motor and blower, which form an essential part of the machines made for clinical work, the valves and piping for mixing the air and ether are the source of greater expense. By substituting good, thick-walled rubber tubing for the metal pipes, and by making use of the well known rocker-valve principle, it is possible to construct at little cost an apparatus which by the movement of a lever will increase or decrease the amount of air flowing across the ether, and at the same time will proportionately decrease or increase the air going directly to the delivery tube in the trachea, without interruption of the total air flow. This has a decided advantage over the method of adjusting screw clamps as in the original Meltzer apparatus, or even of turning several valves as in some of the clinical apparatus.

A reference to the accompanying drawing will show the details of construction. To the middle of a wooden base is firmly attached a wooden upright that supports the rocker valve. At the front of the apparatus is a second upright supporting the mercury manometer, and, if desired, a mercury safety valve. Between the two uprights is placed the bottle to contain the ether. Behind the valve upright is the bottle to contain water, and at the back is the valve for controlling the air flow through the apparatus. The entire apparatus is 44 cm. long and of the same height. The glass and rubber tubing have an inside measurement of 6 mm. and the bottles have a capacity of 800 cc. The air enters through the base of a T tube, one arm of which ends in a short section of rubber tubing that may be closed with a screw clamp. With a constant air supply in excess of that needed, one is able, by allowing the excess to escape through this valve, to regulate the amount of the air passing into the apparatus. The other arm is connected with a glass tube passing through a rubber cork and running close to the bottom of the first bottle, which is partially filled with hot water. The air bubbles through the water and is thus warmed and moistened. It then passes through a Y tube into two parallel rubber tubes which pass through the rocker valve. One of these tubes passes into the ether bottle where the air is conducted *across* the surface of the ether to pass by the outlet tube to one arm of a collecting Y tube. The other tube passes directly from the rocker valve to the collecting Y tube. In the delivery tube leading from the collecting Y tube a mercury manometer for measuring the pressure of the air is interposed, and if desired in experimental work a mercury safety valve may also be set in. A further attachment necessary in intrathoracic work, although not required if the animal has voluntary respiratory movements, is a valve by which the passage of the air-ether mixture through the delivery tube may be temporarily checked and diverted instead to the outside.

The rocker valve, which is the principal feature of this apparatus, requires special description. It is made of hard wood in the shape indicated in the drawing. It is 20 cm. long and 1 cm. thick. The broad lower edge, 5.5 cm. in width, is beveled to a rounded edge and a hole drilled at its middle point 1 cm. above the edge. Through this hole a wire nail is driven pivoting the lever to the front edge of the upright. To each side of the upright, wooden strips supporting the two rubber tubes are placed, so that with the lever in the perpendicular position each tube is so compressed that its lumen is diminished one-half. An equal amount of air will now pass through each tube. By moving the lever to one side so that the lumen of the corresponding tube is completely closed, the opposite tube will be opened to its full size and all the air will pass through it, either directly to the delivery tube or through the ether bottle as the case may be. As one tube is closed, the other is opened to a corresponding degree, and any proportion of the air at a given pressure may be passed across the ether and the amount of anæsthetic be increased or decreased, as the case may require, with a single movement of the lever.

The objection may be raised that the rubber tubing will rapidly wear out under the action of the rocker but as a matter of fact during the



Apparatus for Intratracheal Anesthesia

past year we found it necessary to make but two renewals.

PRACTICAL POINTS IN THE USE OF THE APPARATUS

1. Considerable difference of opinion has been voiced in regard to the necessity of passing the air through water either before or after it has passed over the ether and still more discussion has been raised over the question of warming the air. It is not my intention to take up these matters further than to say that it seems reasonable to believe that the direction of a continuous stream of dry air and ether against the mucosa of the trachea and bronchi for hours at a time is a decidedly abnormal condition and would have an irritating effect. Since this can be avoided by combining a desirable filter and moistener without unduly complicating the apparatus there seems to be no reason for not doing so.

From observations made with this apparatus the writer is inclined to believe that the question of warming the air is one of less importance. Even if the air is warmed in the apparatus it looses its heat and approximates the temperature of the surrounding air as it passes along the delivery tube to the tracheal catheter. With the room temperature at 27° C. and that of the air in the filter bottle at 33.5° C., and with the air flowing at a rate sufficient to maintain a pressure in the delivery tube of 20 mm. of mercury after passing through 150 cm. of thick walled delivery tube, the temperature was found to fall to 29° C. Also, when the air in filter bottle was warmed to 33.5° C. and was passed across the ether its temperature dropped to 23.2° C. at the point of delivery. With the water at room temperature and the air passed directly to the delivery tube the air was delivered at a temperature of 25.2° C., and when passed over the ether was delivered at a temperature of 24.2° C. During these experiments each reading was taken after the air current had been maintained under constant conditions for fifteen minutes.

It will be noted that when the air was passed through water at room temperature, and subsequently carried over ether, it was cooled to a temperature only one degree lower than when carried directly to the delivery tube. When, however, the water was kept hot enough to raise the temperature of the air 6.5° C. above the room temperature, the subsequent carrying of the air across the ether cooled the air to a temperature 5.8° C. lower than when carried directly to the delivery tube, and indeed to a temperature one degree lower than that of unwarmed air carried across ether. When only one-half of the warmed air was passed across the ether and the other half passed directly across, the temperature of the air-ether at the point of delivery was reduced to 24.4° C. as compared with a temperature of 24.5° C. for the unwarmed air under similar conditions.

These observations might justly be used as argument against applying any warming device to the clinical apparatus except at some point in the delivery tube distal to the moistener and ether receptacle. Heating, however, is of advantage in that it aids in vaporizing the ether. In preparing for an operation or experiment, we partly fill the filter bottle with hot water (not full enough to allow the splashing to carry water over to the ether bottle or delivery tube) because it was early found that with the water at room temperature, too small an amount of ether was vaporized and carried over to deeply anæsthetize the larger animals in the first stages of the work, but that by surrounding the water bottle with hot towels or by using hot water in the filter bottle this difficulty was avoided. When the animal is once deeply anæsthetized the subsequent cooling of the water is rather an advantage for the reason mentioned above.

II. While our experience bears out Meltzer's conclusion that it is practically impossible to kill a dog with ether by this method (air passing over ether) we did find, in one case at least, that if the tube carrying the air into the ether bottle extends below the surface of the ether the bubbling greatly increases the evaporating surface and the animal may become decidedly over-anæsthetized. It may be stated, however, in commendation of the method that the efficient

artificial respiration provided by it, when the lever is reversed, suffices to restore the animal. Advantage may be taken of this observation. If a greater concentration of ether vapor is desired and it is not desired to warm the air one can, by simply moving the tube close to the ether, cause a rippling of the surface of the ether and thus bring about a greater evaporation.

III. It was found that it was seldom necessary to change the position of the lever, even in protracted experiments, for the recession of the ether by evaporation when once the desired stage of anæsthesia had been reached, gradually reduced the amount received by the animal and so complied with the rule that the longer the duration of anæsthesia the less the amount of anæsthetic required to maintain a given stage.

IV. A not uncommon question asked by those who are unfamiliar with the method is, "What percentage of ether do you give?" It is of course impossible, in spite of the fact that in some of the clinical machines the dials are marked for this purpose, to reply directly. The factors of temperature, pressure, moisture, evaporating surface of the ether, and volume and rate of air flow all have to be considered in estimating the probable concentration of ether vapor as it is delivered. The reply must be made that enough of the air is directed across the ether to take up an amount of the anæsthetic sufficient to produce the desired stage of anæsthesia.

V. It is customary to speak of operating the apparatus at an air pressure of so many millimeters of mercury. Consideration of the matter will show that such a statement does not mean much. The inference is that the air is being delivered into the trachea at such a pressure and it is even supposed by some that a like pressure exists in the trachea. The following observations will illustrate the difficulties of that view. A pressure reading of 15 mm. with an unvarying pressure of air passing to the apparatus, was increased to 21 mm. when an 18 F. catheter was attached to the delivery tube, and further increased to 22 mm. when the catheter was inserted into the trachea of the animal. A manometric reading of the intratracheal pressure taken at a point just above the sternum showed no increase of pressure. A "machine" pressure, that is, the pressure as shown by the manometer on the apparatus, of 20 mm., gave in one case an intratracheal pressure of 1.4 mm. At 30 mm. the intratracheal pressure remained the same. At 40 mm. it had risen to 1.8 mm. and at 50 mm. it was 2.2 mm. These changes were caused by increasing the air flow through the apparatus. In this case there was a free outflow of air between the catheter and the trachea. Quite different are the results when the space between the catheter and the trachea is diminished. With a "machine" pressure of 20 mm. and an intratracheal pressure of 1 mm., slight restriction of the outflow raised the "machine" pressure to 24 mm. and the intratracheal pressure registered 5 mm. Further constriction raised the pressure to 30 mm. and 14 mm. respectively.

These figures serve to indicate how little a simple reading of the machine pressure means as an index of the pressure to which the lungs are being subjected.

One of the great difficulties in applying this method is to judge the size of catheter to use with an empirically set machine pressure in order to produce an intratracheal pressure that will distend the lungs to the desired degree. The freedom of outflow around the catheter is of course, the determining factor. In neither clinical nor experimental work can this be judged with any degree of accuracy before the catheter is in place. It is decidedly preferable to err by having the outflow excessive; moreover, in our work we found it a very simple matter by constricting the trachea or by pressure upon the larynx to decrease the outflow and consequently always chose a catheter of small size. As in the administration of anæsthesia by other means, the requirements of the individual case must be considered and work by rate avoided.

In clinical work the danger of overdistention of the lungs can, when the thorax is unopened, be prevented by the use of a simple mercury safety valve such as was described by Cotton and Boothby.[2] But in intrathoracic work it would be useless, as the pressure at which the air should be delivered in order to secure efficient ventilation is in excess of that which the unprotected lung could stand without injury if the outflow should be obstructed. A small catheter, digital compression of the trachea and constant inspection of the lungs is the only relatively safe method.

It is surprising how rapidly the intratracheal and the pulmonary pressure will rise to a dangerous degree with only a momentary stoppage of the outflow. This accident has been reported in clinical work when no safety valve was used, from spasm of the glottis, but we have not seen it in our experimental work. As a matter of fact, we have not used the safety attachment on the laboratory apparatus as the short manom-

[2] Cotton, F. J., and Boothby, W. M. Anæsthesia by Intratracheal Insufflation. Surg., Gynec. & Obst., 1911, xiii, 573.

eter tube will allow the mercury to blow out if the pressure rises too high in ordinary work. In intrathoracic work we employ the method previously mentioned. As spasm of the glottis is not feared in animal work we have substituted for digital compression a small adjustable clamp whose curved arms embrace the trachea through the skin and overlying tissue. This can be loosened or tightened with considerable rapidity.

VII. We have used routinely soft rubber catheters with a side hole. Sizes 18 and 20 F. have been found most generally useful. With a little practice they can be introduced with ease and rapidity by the sense of touch alone. The important point is to have the animal thoroughly anæsthetized before attempting to introduce the catheter. This applies with even greater force in clinical work. With a dog on its back, the head is drawn forward so that the nose is parallel with the axis of the body, and the lower jaw is propped widely open and the tongue drawn well forward in the mid-line. Standing on the animal's left side, facing towards its head, the operator passes the index finger of the left hand into the animal's pharynx until the epiglottis is felt. This he presses upward against the base of the tongue and by advancing the finger slightly the edge of the glottis may be felt. With the right hand the tip of the catheter may be pushed along the index finger of the left and guided into the larynx and trachea to the required distance. The end of the catheter is then passed through a hole in a short section of narrow board that is placed behind the long canine teeth and the jaws are bound together on it. The catheter may be held in place by tying it to this mouth gag.

The details of the procedure are given because it is rapid, requires no special appliances and is relatively easy.

VIII. With this apparatus it has been found that for operative work and physiological experiments with intact thorax and normal respiratory movements, a machine pressure of 15 mm. is satisfactory in the majority of cases and that under such circumstances interruption of the inflow is not required. In large animals with strong respiratory movements, higher pressures have been used. These have been employed when by the excursions of the mercury in the manometer, it could be seen that a low machine pressure permitted the inspiratory effort to stop, momentarily, the steady outflow of air from the trachea and so allow the inspiration of mucus or vomitus around the catheter.

IX. It was the writer's impression that he had heard it claimed for the method that by increasing the pressure under which the air is delivered (probably also increasing the intratracheal pressure) a condition of apnœa might be produced and that with the thorax quiet and the lungs in partial distention operations within the thorax or around the diaphragm might be performed with ease.

As the result of experiments with this possibility in mind, it was found that in the intact animal such a condition could be produced at will, but not, however, by merely increasing machine pressure, even though it was raised to 50 mm. If the outflow remained free and no increase of intratracheal pressure resulted, no apnœa developed. If, however, with a machine pressure of 15 or 20 mm. the outflow is so obstructed that an increase of intratracheal pressure of from 8 to 10 mm. was produced, the condition did occur.

The fact that the cessation of respiration occurs simultaneously with a rise of intratracheal pressure and not after a period of over-ventilation that could be considered at all sufficient to produce acapnia, discourages the idea that it is an apnœa due to exhaustion of CO_2. The moment the intratracheal pressure is lowered, by allowing free outflow of air from the trachea, respiration begins and the first few respiratory movements are somewhat exaggerated. It is difficult to believe that the relatively slight pressure within the lungs is sufficient to prevent respiratory efforts by mechanical fixation of the chest walls. During the quiet period inspection does not show extreme distention of the chest. With the thorax opened the same state of psuedoapnœa may be produced, but although respiratory movements are abolished and the lungs quiet, the pressure necessary to produce it causes a distention of the lungs to practically the full capacity of the thorax and consequently access to the other thoracic viscera is interfered with. A very serious objection to the use of this procedure in physiological work is the fact that marked disturbances of the circulation occur when the intrapulmonary pressure is sufficiently raised. A pressure that is sufficient to cause cessation of respiration causes a fall in blood pressure of from 20 to 40 mm. Any lowering of the intratracheal pressure in an attempt to reduce the degree of circulatory disturbance results in a resumption of respiratory movements.

If respiratory movements are not objectionable, intratracheal insufflation suffices perfectly for intrathoracic operations, and where the movements are prevented by curare it is equally valuable, for the amount of intrapulmonary

pressure necessary for ordinary anæsthesia and for efficient artificial respiration is not sufficient to cause circulatory changes such as have been mentioned.

These observations, made in the course of a year's experimental work with intratracheal insufflation, are presented in the hope that they may prove of value to those who contemplate the use of this method. There can be no question that it offers many advantages in experimental work both in animal surgery and in physiological manipulations, over the older methods in vogue in the laboratory. The apparatus devised has complied with all the requirements in point of small cost, simplicity, portability and ease of manipulation.

The phenomenon reported in connection with the increased intrapulmonary pressure and pseudoapnœa are of interest and importance in the clinical as well as the experimental application of intratracheal insufflation. A more complete discussion of the nature and significance of these phenomena will be left for a later communication.

THE FINGER IN RHINOPLASTY — IMPROVED TECHNIQUE

By J. F. BALDWIN, A. M., M. D., Columbus, Ohio
Surgeon to Grant Hospital, etc.

IN plastic work on the nose it is not often that it is at all necessary to resort to the use of material not in the immediate field of operation. Usually material can be readily taken from the cheeks, or from the forehead, to supply the defect. If bone is lacking it may be supplied by taking a piece of the outer table from the forehead, or putting in a piece of the patient's rib. Occasionally, however, the destruction has been so great, either from the disease itself or from previous efforts at repair, that tissues must be taken from some other part of the body.

To meet this demand I have, on two occasions, resorted to the use of the left ring finger. McGraw, of Detroit (*Surgery, Gynecology and Obstetrics*, December, 1910), reports a case of this sort, and in looking up the literature for his report he was able to find but eleven previous cases. I had had one case before the publication of his paper, but had not thought it worth while to report it. That patient was operated upon October 2, 1907. That operation was so successful that the patient has absolutely refused to have anything more done, though I could improve the appearance of the nostrils materially by a slight operation. The result, however, was excellent, and an examination only a few weeks ago showed that the bone had completely maintained its vitality.

Some months ago a second case presented itself to me, the patient being twenty-nine years of age. The disease had developed in her case at the age of seven. She consulted Dr. Ravogli of Cincinnati, with whom I corresponded about the case. He wrote that when he first saw her she was suffering from lupus vulgaris, but he thinks it became tuberculous. The disease had run its course, but a large triangular opening had been left, with complete destruction of the nasal bones, the cartilages, and the soft parts. Local surgeons had attempted repair by using the cheeks and drawing somewhat on the tissues of the upper lip. The operation was a complete failure, and later they took a flap of tissue and bone from the forehead, but that flap sloughed so that when the patient consulted me the disfigurement was most pronounced, this including the scars in the forehead and cheeks, and the materially shortened upper lip. I explained to her the method of using a finger, and she readily consented to the operation.

In planning the operation it seemed to me that an improvement would be secured by having a double layer of skin, so that one layer would be continuous with the skin of the cheeks while the other would take the place of mucous membrane on the inside. To accomplish this result I made a flap low down on the abdomen on the right side. This flap was made by three incisions, making three sides of a rectangle. The skin was dissected up, so that the fourth side made a hinge. Transverse incisions were than made, and the tissues undermined, so that flaps could be brought together to cover the raw surface. The left ring finger was then split along the middle on the palmar surface. Two incisions were made at right angles to this, one being on a line with the finger nail, and the other at the web of the finger.

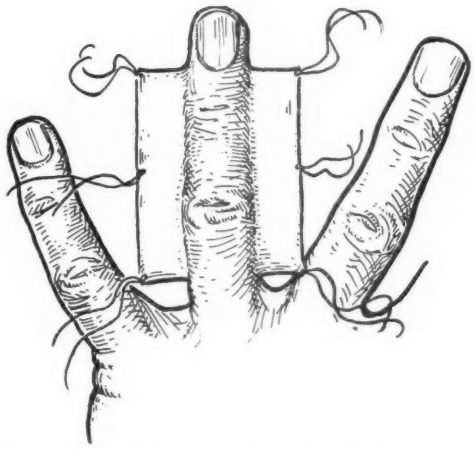


Fig. 1. Back of ring finger, with palmar flaps extended to apply to A.

These two flaps were dissected up, all the tissues to the bone being cut, including the blood-vessels, and the flexor tendons dissected out. This raw surface was then applied to the raw surface of the flap previously dissected on the side, and the edges of the two flaps brought together by three silkworm-gut sutures on each side, which were left long. Other stitches were applied to secure good coaptation. A piece of perforated copper, cut from a Levis splint, was then placed in position, so that by tying the long ends of the silkworm-gut sutures, the combined flaps would be drawn out like bat wings so as to secure ample area. Protective dressings were then applied, the arm bandaged and strapped to the side, and this stage of the operation thus completed. Two weeks later the hand was detached from the side by cutting across the flap, and the patient allowed to return home, still keeping the copper splint in place to avoid any contraction of the flaps.

The blood-vessels entering the flaps had been purposely cut by the transverse incisions so as to get a more uniform circulation throughout the flaps, in anticipation of the transfer of the finger to the face.

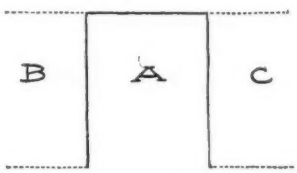


Fig. 2. Flap A, to be dissected up and laid back to apply to flaps on finger: B and C to be undermined and brought together to cover raw surface.

After the lapse of several weeks the patient returned for the second stage of the operation. The distal end of the finger was prepared by removing the skin of the tip, together with the nail and its matrix. The edges of the rectangular flap were then trimmed up and slightly split. The lateral borders of the opening in the face were also split slightly so as to present two flaps. The tissues were undermined at the upper end of the field of operation, so that the denuded finger tip could be brought into connection with the frontal bone. The two internal flaps of face and finger were then united with fine silk left long, after which the external flaps were carefully adjusted, and plaster of paris applied, so as to hold the trunk, arm and head in a fixed position. That part of the cast designed to fix the trunk and head had been put in position the day before when the patient was not anæsthetized. This greatly simplified the application of the plaster designed simply to fix the arm and hand. Healing took place promptly, and although the finger was not detached from the hand until the end of three weeks the patient complained very little of discomfort, and the result has been in every way pleasing.

The use of the skin flap from the abdomen to make a lining for the new nose is, so far as I know, original, and in this case certainly proved most satisfactory.

NOTES ON ETHER ADMINISTRATION

By WELLER VAN HOOK, A. B., M. D., Chicago

THE profession, especially in America and in the north of our country, recognize freely the great superiority of sulphuric ether over other known agents as an anæsthetic where maximum safety is considered. Its safety more than compensates for its disadvantages. Nevertheless, the ideal mode of administration has not been found for general practice and possibly for some time to come will present an object of study.

The problem of ether administration would seem to be to introduce with the inspired air, a sufficient proportion of vapor of ether at the temperature of the body or at least of the air of the room itself in which the anæsthetic is given, to bring about the peculiar effect of annulling consciousness. In Surgery, Gynecology and Obstetrics, May, 1912, page 462, is described an apparatus which has for one of its purposes the preparation of warmed vapor of ether in mixtures with air and oxygen. The apparatus is too complicated and bulky for universal use though it may become of great value in hospital practice. Too much cannot be said in commendation of efforts looking to the application of ether in the form of warmed vapor with an air admixture.

The difficulties attending the inhalation method from saturated cotton or other substances held near the nose and mouth are serious indeed. The Esmarch mask, which has been much vaunted of late, has the advantage that the patient as a rule will not get too much of the vapor, but on the other hand he frequently does not get enough. This difficulty is so serious that as a rule the administrator is obliged to place towels or napkins on the face at the side of the mask so that the mask becomes a poor substitute for a cone. An additional disadvantage is the wasting of the vapor into the air with the resulting unpleasant and even serious effect upon the operator and his assistants. When we consider the very grave consequences that follow upon the partial or complete return to consciousness of a patient while one is performing a difficult and delicate operation, we must agree that methods should be found whereby the possibilities of such an occurrence may be reduced to the minimum.

The theory that the anæsthetist is necessarily a stupid person against whom the precaution of using a fool-proof apparatus must be taken, is unfortunate in the extreme. Remember we should endeavor to train our anæsthetist in the ordinary principles of anæsthesia so carefully that such crude apparatus as the Esmarch mask may be set aside.

Apart from the requirements of warming the ether vapor by some agent other than the breath of the patient and the air of the room, the old cone in improved form affords the ideal method of administration, provided it is properly made and used.

The manufacture of ether cones of the proper kind is very simple but attention should be given to detail. The cones are so inexpensive and take so short a time to prepare that a number of them should be at hand, whenever operations are contemplated, of different sizes to fit the faces of patients of different ages and sizes.

The following is a very simple mode of constructing such a cone: A piece of card-board or heavy paper four to five inches wide and nine to thirteen inches long should be folded transversely in the middle. This makes the frame of the mask. Cover the cardboard with heavy cotton cloth; bandage muslin is good. A towel may be used and pins applied, although stitches are a little neater. Leave one of the openings into this ring-shaped frame quite free for the face; the other opening is slightly diminished in extent by the use of a couple of stitches or pins placed about one inch from each end. The apparatus is ready to use as soon as a mass of surgical cotton is placed in the upper part of the cone, opposite the opening.

In using the apparatus, several important principles are to be observed.

1. The cone must fit the face, must be not too large and not too small. The beard, if the patient wear one, is to be plastered down on the face with vaseline so that air does not find entrance at the sides of the mask. Upon beginning the administration of the anæsthetic, invert the cone and from the lower side apply not less than half an ounce of ether. A few drops at a time torment the patient very much. The usual methods of instructing the patient and slowly applying the anæsthetic are to be pursued.

2. Remember, as a very important point in the administration of ether by the cone method, the fact that the exhaled air from the patient's lungs

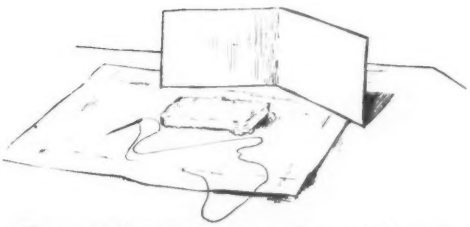


Fig. 1. Making an ether cone: The materials, a sheet of card-board, five and a half by fourteen inches; a piece of muslin eleven by twenty-eight inches; needle and thread and a piece of cotton.

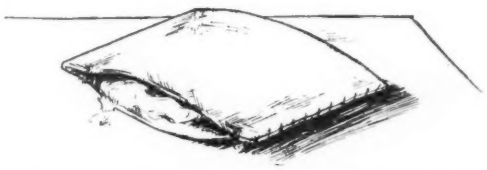


Fig. 2. Cone completed by folding cloth over card-board then sewing. Note large opening at top of cone.

contains a large percentage of water and the change of the form of the ether from liquid to vapor demands much heat, which is supplied by radiation from the patient's face, by cooling of the expired air and by convection from the surrounding air, etc. Hence condensation of moisture from the patient's face soon saturates the mask and cotton with water. Ice sometimes is formed when the patient's respiration is rapid. It can easily be seen that the mask at first in use must be thrown away in a little time and a fresh one substituted. If this is not done, the patient cannot get sufficient air, since the water-soaked cotton obstructs its passage and the anæsthetist thinks that the patient is getting enough ether because the cotton is wet. Most anæsthetists are ignorant of the fact that the moisture of the breath thus condenses so that a water-soaked cone is often kept pressed down upon the face of the patient, who is not getting enough anæsthetic, with no result except that the patient is partly asphyxiated.

Hence, a few minutes after the beginning of the administration, when the patient has become thoroughly quieted and the easy and steady stage of anæsthesia has been reached, a fresh cone should be taken. This should again be done at subsequent periods of the operation, if it be prolonged. When this change is made, the water-soaked cone must be carried out of the room, in order that its waste vapor or ether may not contaminate the air. The anæsthetist will be pleased to see what an improvement occurs in the management of the case when the old cone has been set aside and a new one taken up.

3. It is most important that the opening of the cone at the top be almost as large as is afforded by the entire length of the cone. This precaution it is, of course, the purpose of the mask to do away with, yet it is so simple a thing to keep this opening patent that no difficulty in practice ought to occur.

While it is important that open spaces between the skin and the edge of the mask be avoided it is equally desirable that the face should not be injured by undue pressure on the part of the anæsthetist.

4. Spasm of the muscles of the respiratory tract is often a matter of serious consequence. When it occurs, the jaw is to be held forward and irritation by a sort of tickling applied about the costal region of the thorax. Or respiration may be stimulated by pressure upon the thorax and, if necessary, dilatation of the sphincter ani may be practiced.

It is not necessary to use a mouth-gag with which to pry open the teeth and to drag forward the tongue. Mucus from the bronchial tubes and saliva are never to be wiped out with cotton or gauze in the form of a swab. The best method when an excess of mucus forms, when vomiting occurs or when saliva is excessive, is to raise the foot of the table or tilt the top of the table to the production of Trendelenburg's position. The fluids do no harm unless they interfere with breathing or run into the lungs.

The position of the head, neck and shoulders are most important. It should be remembered that the fluids from the trachea and pharynx will run out from the nose and mouth without difficulty provided the lips and nose are lower than the lungs. Recall the anatomy of these parts. If the shoulders are raised by placing a small round sand-bag at the root of the neck, the spine of the neck will be so straightened that respiration will be easier. The head should not occupy a cramped relationship to the axis of the neck. The head itself should be so placed as to cervicocephalic extension that the chin is raised and the vertex turned backward, the trachea being thereby straightened. One can easily see what the effect of this phase of posture will be, how the jaw can then easily be used in order to hold the pharynx and larynx in proper relations.

One should notice the peculiarities of each individual patient's anatomy. The man with a

short, thick neck will require more attention than a young boy with a long and slender neck. An elderly person with stiffened structures is often difficult to manage. Where the antero-posterior curves of back and neck are pronounced, there should be an especial effort made to diminish their prominence and in the second place to provide comfort and ease of posture.

It is often desirable to place a folded sheet at the junction of neck and shoulders and also to supply a small sand bag as a pillow just below the occiput. When the sand bag is adjusted and the patient's head has been fitted to it, there will be no trouble in modifying the curves of the neck, as time passes during the anæsthesia.

The beginning of anæsthesia constitutes a period of anxiety for both patient and surgeon. Too often the anæsthetist fails to treat his patient as a fellow mortal and starts to anæsthetize him without formality. Twenty seconds may be spent in saying to the patient, "Mr. Jones, I am Dr. Smith and your surgeon Dr. So-and-So wishes me to administer your anæsthetic." A pleasant word or two about any promising feature of the outlook from the patient's point of view will give the patient confidence in the man who is to have his life in charge for a while and will often have the effect of distinctly quieting the nervous system. Boisterous and confused conversation and activity are most undesirable about a patient who is going to sleep. On the contrary everything should be quiet and peaceful. Many people are unfamiliar with the odor of anæsthetics and few indeed realize what sensations are to be associated with the taking of the drug. Hence the patient should have his attention called to the odor of ether and should be told that though the experience he will have will be somewhat disagreeable, he is to breathe in the ether in a friendly manner; try to go to sleep and not make any attempt to oppose the procedure. Needless to say the patient should not have the feeling of being physically restrained. Instead of sending the patient into agony, the passing into unconsciousness from the use of ether may be made a thing of much mitigated horror.

When once anæsthesia is established, it should be the effort of the administrator to maintain the sleeping condition steadily without gross interruptions until the work of the surgeon is concluded. With the cone this can be done much more effectively than with the mask. It is important that the anæsthetizer should continually watch his cone to see that it remains in a fresh and clean condition, discarding the old cones as rapidly as they become soiled.

The whole duty of administering the anæsthetic can be made a happy and beautiful service with patience and real thoughtfulness. Many years of experience with internes has failed to discover more than a very small number of young men who have not at once become deeply interested in the careful administration of ether after the methods suggested and most men have become skillful in a very brief time.

By the careful study and practice of these hints, the writer believes that most of the difficulties of ether anæsthesia in common practice may be done away with and that the barbarities associated with the use of tongue forceps and swabbing of the pharynx may be avoided.

THE USELESSNESS OF WARMING ANÆSTHETIC VAPORS

By F. J. COTTON, M. D., and WALTER M. BOOTHBY, M. D., Boston, Massachusetts

THE closed or so-called vapor method of anæsthesia has recently shown evidence of a return to popularity, and once again we are hearing much about the advantages of artificially warming the anæsthetic mixture before inhalation.

Actual experiments determining the temperature of the mixture before inhalation are comparatively few. Those reported have not been given in sufficient detail to determine whether or not all precautions were taken against experimental error.

The following experiments were therefore conducted. The laboratory experiments were done under our direction by our assistant, Miss Janet Wood, and later repeated by one of us with every precaution taken against experimental error.

Experiment 1. To determine the temperature of nitrous-oxide as delivered by the "Cotton-Boothby" apparatus. A thermometer was placed in the gas-current at the point where ordinarily the rebreathing bag would be attached when the latter is directly connected with the mask. The thermometer was so arranged that the bulb and stem, up beyond the point of reading, were

supported in the gas stream without contact with the glass tubing; this tube was of sufficient size to permit this, and also to allow room for the gas to escape around the thermometer. In other words, we were careful to take the temperature of the gas and not of its conductor. The rate of flow of nitrous-oxide was at least three times that used in routine surgical anæsthesia, in order that the extreme of cold might be recorded.

Time	Temp. Room	Temp. of Thermometer in gas-current
9.15	21.5° C.	21.5° C.
9.30	21.5° C.	21.5° C.
9.31	.....	.....
10.00	21.5° C.	18° C.

Remarks. From 9:31 to 10:00 the gas bubbled through ether, so that in 30 minutes ⅔ lb. ether was evaporated, an excessive amount.

It will be noted that even when we were using a large excess of gas, constantly bubbling through ether (theoretically the coldest combination possible), the temperature of the mixture as it would be delivered to the rebreathing bag was only 2½° C. lower than the room temperature: without ether the gas was delivered at room temperature, though probably near zero in the cylinder.

These temperatures represent those obtainable with the apparatus as arranged for regular use; by shortening the delivery tube from three feet down to four inches we found the temperature of the gas at this latter point reduced somewhat more, to 16° C.

Experiment II. In order to know the temperature of air bubbled through ether as used for intratracheal anæsthesia, without any heating device, the following figures were determined.

Time	T. Room	T. Air Current before passing through ether	T. Air in Ether bottle	T. of Air and Ether at end of 3 ft. tube
10.30	25° C.	23½° C.	....	23½°*
10.31	....	....	....	†
10.40	25°	23°	20½°	23°
10.45	25°	23°	15½°	23°
11.00	25°	23°	16°	23°‡

*No ether. †Ether started. ‡Ice formed on ether bottle.

This experiment shows that air from an intratracheal apparatus, with a three-foot tube leading from the ether bottle to the catheter, will not be affected by the addition of as much ether vapor as is needed for anæsthetic purposes; even in the bottle itself the temperature only falls to 15½° C., although around the *ether level* the glass is sufficiently cold to cause the moisture in the air to freeze on the glass.

Experiment III. This experiment was to determine the effect of an efficient heating apparatus.

T. Room	T. Air-current before heating	T. Air-current as it leaves the heating apparatus	T. Air as it passes from rebreathing bag into mask
26° C.	22½° C.	120° C.+*	31° C.

*Went beyond range of thermometer.

The above temperature readings show that gas loses its heat very rapidly, and that to produce any appreciable elevation at the mask the heating appliance must be able to warm it to a very high degree. Even with such an appliance it was impossible to raise the temperature of the air more than five degrees above room temperature.

In other words, we have in a measure failed to understand in the past how quickly a gas warms or cools to the temperature of its containing tube. When nitrous-oxide passes from liquid to gas at atmospheric pressure the cold produced is intense (so too, also, with ether evaporation), yet if this gas passes through even a few feet of tubing it comes to about room temperature. And even if we heat the gases to 120° C., they are breathed by the patient at 31° C., as against 26° C., temperature of room.

In other words all this fuss about warming the gases is rather futile, because it does not work out in practice.

Finally, we carried out a real clinical test to determine the actual temperature at which nitrous oxide-oxygen-ether is inhaled by the patient. We introduced a thermometer into the mask of the "Cotton-Boothby" apparatus, without any heating appliance. The bulb of the thermometer was free in the gas-mixture 2½ inches from the mouth, in the direct current between the mask and the rebreathing-bag. The room temperature was 25° C. throughout the experiment.

The subject of the experiment was a strong well-developed woman, of about 40, and the operation consisted of an exploration of the upper abdomen, with eventual drainage of the gall-bladder.

At the beginning of the operation the temperature in the mask was, on inspiration, 32° C., (89.6 F.), and on expiration, 33° C. At the termination of the operation, one hour later, the temperature on inspiration was 34° C., and on expiration 35° C. (95 F.). The effect of intermittent addition of ether vapor to the respired mixture could not be detected by the thermometer.

These experiments seem effectively and permanently to dispose of the argument for the necessity of artificially warming the respired mixture.

In our earlier work we had not become "wise" to the fallacy, and we spent good time and money on heaters, only to learn that they did not really make any difference, except in expense and trouble.

In some few cases we could trace an effect,

but it was only in the complaint by the patients of a dry mouth and throat after recovery from the anæsthetic.

In regard to the closed method of ether-administration, one thing must be said. The apparatus designed for this purpose secures an *even* vaporization of ether, too often absent in the rougher methods and in this way avoids imitation of the air-passages. This is an important advantage.

A NOTE ON A PICRIC ACID AND OIL OF CLOVES PREPARATION OF CATGUT

By C. A. ROEDER, M. D., Grand Island, Nebraska

THE simplest procedure for sterilizing catgut through and through without decreasing its tensile strength is the most desirable, especially with active hospital services where the trouble of preparing and the cost of sterile catgut is not a negligible factor. We have used a picric acid preparation for the last six months in all parts of the body and have found it very satisfactory in every case. The method, very simple and inexpensive, is as follows: the gut is cut into the desired lengths, rolled over three fingers, tied and placed in a saturated solution of picric acid in oil of cloves for one week, rinsed thoroughly for about ten seconds in sterile water or a 1–5000 bichloride solution to remove the oil globules clinging to the surface, and then stored in 95 per cent grain alcohol. In seventy-two hours it is ready for use. The acid and the oil both being soluble in alcohol are extracted to a considerable extent from the catgut, giving a suture unirritating to the tissues. Samples prepared six months ago have shown no evidences of deterioration.

This produces a suture absolutely sterile through and through as picric acid and oil of cloves have marked penetrating powers for animal tissue. The oil of cloves, besides acting as a powerful germicide, renders the gut pliable, very strong and less quickly absorbed. The marked germicidal power of picric acid has been shown by Ehrenfried (J. Am. M. Ass., Feb. 11, 1912). In addition to his experiments, I asked the Chicago Laboratory to test the germicidal power of a saturated aqueous solution of picric acid and of a saturated solution of the acid in oil of cloves on the anthrax organism, a bacterium well known for its resistance toward chemical agents. They also tested the catgut thoroughly, prepared from this method. They report the following:

The germicidal efficiency of a saturated solution of picric acid in oil of cloves was tested against the anthrax organism using the Rideal-Walker method. The carbolic acid coefficient of this solution is 1.8. It was effective in dilutions up to 1 to 500, killing the organisms in five minutes. It was inefficient at higher dilutions.

They also found that the germicidal efficiency of a saturated aqueous solution of picric acid, which has a carbolic acid coefficient of .6 per cent using the Rideal-Walker method, at a dilution of 1 to 100 killed the anthrax organism in ten minutes. Higher dilutions had no germicidal effect whatever in thirty minutes exposure. This illustrates the germicidal value of combining the acid with the oil.

Ten different tests of the No. 2 catgut, planted in broth tubes, incubated at 37.5 degrees centigrade for 48 hours showed no growth.

The gut prepared by this formula is particularly adapted for the inside suture of gastro-intestinal work and for the reunion of fascia and tendons. It possesses such great tensile strength that a size larger than No. 2 is never necessary and holds united muscle and fascia for one week, this having been found true in two cases requiring secondary operations. Needless to say that this is very desirable in uniting fascia as the majority of preparations of catgut are so soft after 48 hours in tissue that they are very apt to allow spreading of the incision before a firm union has taken place. This preparation, unlike those hardened in chromic acid, is absorbed in a desirable length of time and in being absorbed liberates small quantities of these two germicides, too small to produce toxæmia of the system but in quantities sufficient to inhibit local bacterial growth. It may be that in those suffering with syphilis the iodine preparations would produce better union.

THE DIAGNOSIS OF URETERAL CALCULUS BY MEANS OF THE WAX-TIPPED WHALEBONE FILIFORM BOUGIE USED WITH THE NITZE CYSTOSCOPE

By BURTON HARRIS, M. D., Brooklyn

THE method of using wax-tipped catheters, as employed by Kelly,[1] in exploring the ureter for calculus, has not found favor, for the reason that catheterization of the ureter through the straight speculum is often painful, tedious and difficult. Moreover, it is applicable only in the female.

Ayres[2] has successfully employed a Tilden Brown direct vision instrument in the male. He states: "I agree with Bevan that the Kelly method is not applicable to the male, nor can the indirect catheterizing cystoscope be used successfully. . . . The only instrument now made that can be used for this purpose is Brown's old model —the one with the projecting telescope." Keyes[3] also states: "It can be employed satisfactorily only with the direct vision cystoscope, and best with Kelly's cystoscope."

After considerable experience with the direct vision technique, I was compelled to discard it as unreliable and misleading, for one could never be quite certain that a given abrasion of the tip was not acquired in passing the telescope through the sheath. As a further objection, it must be noted that catheterization of the ureter by the direct method is a mechanical impossibility in a large percentage of male cases.

My own studies have shown that the indirect catheterizing cystoscope of Nitze, as I now employ it, is not only useful but decidedly preferable to all others. The technique is applicable to all male and female cases in which ureteral catheterization is possible, and is so simple and reliable that it finds ready application in that large class of cases in which skiagraphy is negative or indefinite.

A scratch is necessarily the best possible evidence of the presence of stone in the ureter or at the pelvo-ureteral junction, and in my experience a negative result is equally reliable in excluding the possibility of calculus. Indeed, it is not improbable that we shall find ureteral exploration with the bulbous wax-tip more reliable than skiagraphy.

[1] Kelly, H. Operative Gynecology, 1906.
[2] Ayres, W. Am. J. Surg., 1908, XXII, 330.
[3] Keyes, E. L., J. Genito-Urinary Diseases, 1910.

Technique. A No. 3 F. tapered whalebone filiform[4], 75 centimeters in length and having an olivary tip, is *first* passed through the cystoscope; the tip being allowed to extend beyond the deflector for a distance of 15 centimeters greater than the length of the catheter channel. In the female the 15 centimeters is of itself sufficient. The tip is then prepared by dipping quickly into melted beeswax. Occasionally the first drop will congeal in the desired size and contour. More often it is necessary to enlarge the bulb by dipping again after the first coat has been allowed to harden. The tips here illustrated measure from 6 to 8 F. Occasionally a ureteral orifice may be found too small to permit of the introduction of the ordinary bulbous wax tip. In such cases a wax spindle[5] on the shaft of the filiform, 2 or 3 centimeters from the tip, will pass quite readily, the distal end of the filiform acting as a guide. Such spindles are easily made by dipping and quickly holding the filiform point *upward* while the wax is still fluid. The integrity of the wax surface having been established by examination under a lens, the filiform is lubricated and the tip introduced into the previously distended bladder; the cystoscope then being guided over it after the manner of a tunneled sound. (Fig. 1.)

On illuminating the viscus, the filiform is found partly coiled; the tip, owing to the resiliency of the whalebone, lying flat against the bladder wall or being buried in the soft mucosa. (Fig. 2.) It is this factor which reduces to a negligible quantity the possibility of accidental abrasion of the wax by the beak of the cystoscope. The deflector is now raised and the filiform cautiously withdrawn until the perfect tip presents in the center of the field. (Fig. 3.)

In exploring the ureter a decided jump[6] is sometimes observed in that portion of the fili-

[4] A New York firm is now attempting to mark off these filiforms in centimeters.

[5] By a similar technique I have recently employed whalebone spindles as ureteral dilators.

[6] In several recent cases the tip has shown a scratch, although it had traversed the ureter quite smoothly. Under such circumstances the approximate location of the stone may be determined by exploring with a second tip; the latter being withdrawn and inspected after every five centimeters of its introduction. Distances are estimated by measuring between the nipple of the cystoscope and the proximal end of the filiform.

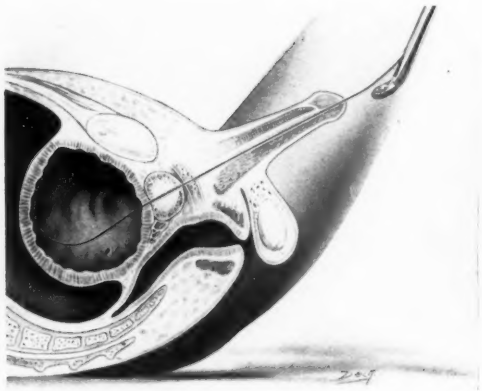


Fig. 1. Wax-tipped filiform in bladder and cystoscope about to be guided over it.

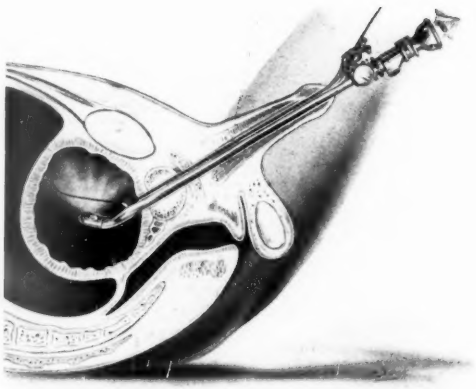


Fig. 2. Deflector has been raised and filiform is being withdrawn.

form between the deflector and the ureteral orifice. In event of such partial obstruction being due to calculus, the chances of obtaining a scratch would obviously be increased by causing the wax tip to pass over the point several times. In Case 2, reported below, a faint snap could be *felt* in withdrawing the tip past the obstruction — exactly comparable to exploration of the urethra with the bougie à boule. On completing the exploration, the filiform is again withdrawn until the tip presents in the center of the field and within the focal distance of the instrument. When the fluid in the bladder is clear and the wax is not covered by blood or mucus, it may be inspected through the cystoscope by slowly rolling the filiform between the thumb and finger. In event of a positive result one may remove the filiform and proceed with the routine catheterization of the ureters; thus obviating the necessity for reintroduction of the cystoscope. If, however, there is any doubt regarding the presence of a scratch, it is better to withdraw the cystoscope; the tip being allowed to remain either in the ureter or on the upper wall of the bladder until after the beak of the cystoscope has left the posterior urethra. The tip is then washed in cold water and examined under a lens.

The following is a synoptic report of three recent cases illustrating the application of the method.

Case 1. F. D., male, aged 49, was referred by Dr. E. O. Darbois on October 1, 1911, with a history of hæmaturia since September 27th. There were absolutely no symptoms referable to the kidney or ureter, but the patient had suffered from "intestinal indigestion" for nine months.

Examination. Urine passed per urethram was quite clear but showed the characteristic chemical and microscopic evidence of a rather severe chronic catarrhal nephritis with irritation of the renal pelvis due to concretions of calcium oxalate. Cystoscopy showed a normal bladder. On the right side, No. 5 F. olive-tipped catheter passed freely to the renal pelvis, and the urine was found to be normal with the exception that it contained an excess of phosphates. Urea: 0,024 per cc. Phenosulphonephthalein appeared six minutes after hypodermic injection. On the left side, a No. 5 F. olive-tipped catheter met partial obstruction at the pelvo-ureteral junction. The urine was almost clear, highly acid, and contained a moderate amount of albumen. Urea: 0,006 per cc. Phenosulphonephthalein appeared in twenty-one minutes. Microscopic examination showed epithelia from the convoluted tubules in moderate numbers, and from the renal pelvis abundant cells with many from the deeper layers. There were a few red blood-corpuscles and leucocytes. No bacteria. Many concretions of calcium oxalate. A wax-tipped filiform found the previously mentioned obstruction. The scratch is shown in Fig. 4. A skiagraph was not taken.

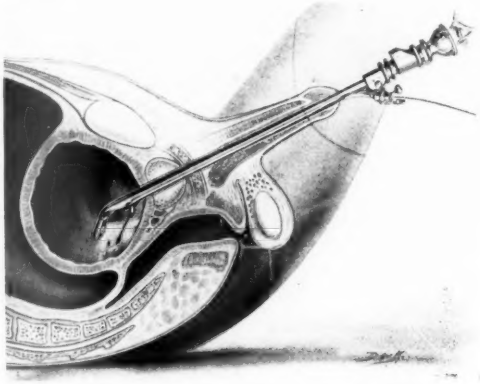


Fig. 3. Perfect wax tip is now ready for ureteral exploration.

Case 1. Case 2. Case 3.

Fig. 4. Photographs (X ¼) showing character of calculi and scratches on wax-tipped whalebone filiform ureteral bougies.

Operation by the author on January 2, 1912. A rough oxalate calculus, lenticular in shape and weighing 0.845 grammes was removed from the inferior major calyx of the left kidney by nephrolithotomy. (Note that the stone was not in this location on October 1, 1911.) Patient discharged on January 21st, the gastro-intestinal symptoms having entirely cleared up.

Case 2. A. B., male, aged 23, was referred by Dr. Russell S. Fowler on May 2, 1911, with a history of occasional attacks of typical right renal colic extending over a period of five years. Skiagraphs of the kidney and ureter were negative. Urinalysis showed the evidence of a chronic catarrhal pyelonephritis and ureteritis without infection. Cystoscopy showed slight retraction of the right ureteral orifice, but No. 5 F. olive-tipped catheters passed freely to both renal pelves. The urine taken from the left side was normal. Urea: 0,022 per cc. Phenolsulphonephthalein appeared in four minutes. That taken from the right side showed chronic catarrhal pyelonephritis without infection. There were pelvic epithelia and concretions of both calcium oxalate and uric acid in large numbers. Urea: 0,007 per cc. Phenolsulphonephthalein appeared in twelve minutes.

Operation by Dr. Fowler on May 15, 1911. Hemisection and exploration of the ureter with a No. 6 ureteral catheter discovered no stone. The patient returned to us on December 10th suffering from a recurrence of his old symptoms. Skiagraphy was again negative. Cystoscopy and analysis of the separate urines showed results similar to those of previous examination. No. 6 blunt-tipped catheters passed freely to both renal pelves, but a No. 8 F. wax-tipped filiform found partial obstruction at a point 10 centimeters from the ureteral orifice. The scratch is shown in Fig. 4.

Second operation, January 12, 1912. Post-peritoneal route. A spindle-shaped mixed oxalate and urate calculus was found at the brim of the pelvis. Weight: .55 grammes.

Case 3. M. K., female, aged 40, was referred by Dr. R. S. Fowler on March 7, 1912, with a history of several attacks, simulating renal colic, during the summer of 1911. At the time of admission she complained of occasional aching pain over the right sacro-iliac articulation. Skiagraphs were negative. (Patient very stout.) Analysis of the bladder urine showed a chronic catarrhal pyelonephritis and ureteritis without infection. There were many concretions of uric acid. Cystoscopy showed rather marked general cystitis. No. 6 F. olive-tipped catheters passed freely to both renal pelves. The urine from the left kidney showed no abnormality. That from the right contained a moderate amount of albumen. Epithelia from the renal pelvis and ureter were present in large numbers. The sediment was loaded with concretions of uric acid. A No. 7 F. wax-tipped filiform found partial obstruction at a point 10 centimeters from the ureteral orifice. The scratch is shown in Fig. 4.

Transperitoneal operation by Dr. Fowler on March 11th. A rather smooth urate calculus weighing 0.846 grammes was found at the pelvic brim.

SOME GENITO-URINARY SURGERY RECENTLY DONE IN VIENNA AND BERLIN[1]

By CHARLES E. BARNETT, M. D., Fort Wayne, Indiana

TO see how the other fellow does his work, no matter whether it is poorer or better than your own, is of interest, so the writer will give you a brief report of some urologic work he saw recently at the clinics of Vienna and Berlin.

He found the assistants, in Vienna, doing far more operative work than usual, and was given as a cause that on account of a possible internal war following Franz Joseph's death, the assistants were in training preparatory for military surgery. On this account the anæsthetists were frequently the lesser military surgeons. The trained anæsthetist is almost an unknown quantity there. The anæsthetic predominating was chloroform. Some were using the old Billroth (A, 40 per cent; E, 30 per cent; C, 30 per cent) mixture and swearing by it. Ether is seldom used and nitrous oxide gas was never used. Local anæsthesia is frequently done, both spinal and otherwise, for major operations. Iodine solution is almost universally used in skin sterilization following the "wash-up." It is also frequently used again following the operation.

Silk is still the favorite ligature and suture material in use everywhere, yet the writer finds the best operators using much more catgut than heretofore, especially in the region of the mucous membrane. The genito-urinary surgeon is in advance of the general surgeon in that regard.

The X-ray work in kidney and ureteral stone is most admirable and in the writer's opinion even excels our work here.

Litholopaxy with one per cent eucain anæsthesia is done on all bladder stones small enough to crush, giving the patient a second or third sitting if necessary. The Thompson or Bigelow lithotrite (Weiss) is most generally used. The writer saw one case done by Zuckerkandl (secondary) whereby the cystoscope showed four stones small enough to be evacuated without the use of the lithotrite.

In conversation with von Frisch the writer has the following notes:

February 10, 1912. Does internal urethrotomy followed by Koolman dilatation. Prefers graduated steel sounds for most strictures. Indigo carmin for kidney functional test; does not know phenol-sulphone-phthalein test. Kidney test dependent upon examination of urine from catheterized ureters. Unfavorable results with pyelography. Uses autogenous vaccines but does not know about reaction from vaccine; results questionable. Oxcyanide of mercury, silver nitrate and permanganate in chronic post urethritis. Believes in Tandler's idea of so-called middle lobe enlargement and consequently does suprapubic prostatectomy. Says suprapubic prostatectomy is easier than perineal and that is the reasor for using the former method.

February 10, 1912. Finger, in speaking of Salvarsan, lays especial stress upon its danger in cases of true organic nerve lesions. Intravenous administration is practically the method followed by all.

Fig. 1. Shows Zuckerkandl's illustration of the Tandler-Zuckerkandl-Stoerk-Alberans theory supporting suprapubic prostatectomy. (a) shows normal gland with centers for hypertrophy in the Lobus Centralis (L.C.) (Alberans) and Lobus anterior (L.a.) also the Lobus posterior (L.p.) and Ejaculatory duct (Ej.d.). (b) shows the relation after hypertrophy has taken place, thus leaving the posterior lobe and lateral lobes free from hypertrophic changes.

[1] Read before the American Urological Association, New York, April, 1912.

Fig. 2. Shows a cross section of an adenomatous prostate. Running through the lower third you see the probe marking the ejaculatory duct fissure, thus showing the fallacy of the possibility of removing the gland without destroying the ejaculatory ducts. This condition is present in practically all large prostates.

The following operative cases taken from my notes cover portions of the means for diagnosis, after the treatment and surgical technique of a few of the operators in ureteral stone, kidney stone, tubercular nephrectomy, hysterectomy and suprapubic prostatectomy.

February 15. (Zuckerkandl) Ureteral stone; shadow showed below sacro-iliac synchondrosis. Supra-poupart-lumbar incision; opened peritoneum by mistake; closed peritoneum; mistook external iliac artery for ureter until it was seen pulsating; finally found ureter; brought stone from bladder muscularis; showed stone; cut down on it; removed same; closed ureter with catgut; drained with iodoform gauze and rubber drainage tube.

February 22. (Zuckerkandl) Right nephrolithiasis; X-ray photo showed large stone in two segments; usual incision; patient in "kidney box" (saddle) with thorax slightly downward, opened down to fat; dissected kidney fascia loose with tissue forceps; delivered kidney; opened lower pole; delivered small stone, then large one; closed kidney; deep Halstead sutures (catgut) with long slender needle; superficial with interrupted catgut; drain, iodoform gauze and tube to lower fossa; closed lumbar fascia and muscles with interrupted catgut; silk for skin.

February 13. (Zuckerkandl). Double orchectomy for tuberculosis; gives carbolic acid treatment to vasii afterward.

February 15. (Zuckerkandl). Tuberculous kidney; on account of inability to catheterize either ureter and consequently unable to do phenol-sulphone-phthalein test, he first opened down to left kidney; found it cystic; he then did a right nephrotomy; found right kidney good; put in temporary drain; closed with catgut; and silk for skin; re-opened left wound; removed small cystic kidney, with much difficulty from hæmorrhage after ligating off stump; fixed ureter stump with catgut (iodized); brought both ends out of opening in drainage tube; fixed tube to ureter; would have fixed ureter to skin had same been mobile; (will treat ureter stump through tube with carbolic acid); iodoform gauze in kidney fossa; closed in usual way; tuberculin not used post operative.

February 26. (Israel). Nephrectomy, left kidney for tuberculosis. Diagnosis: Found tubercle bacilli in urine; no phenol-sulphone-phthalein used; does not believe in it; indigo carmin preferred; no tuberculin used for either diagnosis or for treatment; ureteral catheter in ureter for one hour is dangerous; incision from twelfth rib to anterior spine down to kidney fat; kidney loosed throughout; ureter isolated; renal vessels ligated with catgut; kidney severed from renal vessels; ureter dissected down low and clamped; upper ureter clamped and severed; ureter catheter introduced; pure carbolic acid injected and then withdrawn; catheter and sponge removed; drain put in kidney fossa temporarily; fascia closed with catgut; skin closed with silk.

February 16. (Wertheim.) Panhysterectomy attempted; assistant's hands used for retracting; left broad ligament nicely severed; ureter shown and dissection made down into the vagina; right side was found impossible on account of ureter occupying cancer mass; hysterectomy was abandoned and all peritoneal surfaces closed again with silk; in closing the abdomen two silk skin stay sutures were used and the rest of the skin closed with metal clips; Wertheim's operative mortality for carcinoma is now six per cent; five years longevity sixty per cent; all cases carefully selected; he does vaginal hysterectomy in non-malignant cases and prefers bisecting the uterus.

February 22. (Zuckerkandl). Suprapubic prostatectomy; (two weeks preparatory treatment); local anæsthesia; mild per cent of eucain; first skin, then under fascia; then between skin and fascia; then through perineum to prostatic region with finger in rectum; some chloroform was found necessary; suprapubic incision; bladder found distended; opened with knife; put in specula retractors, after removing a quantity of stones; prostatic hypertrophy was shown at bladder neck; introduced "screw"; did not hold

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 3. Shows the cross-sected gland of Fig. 2 replaced against its fellow, with the sinus pocularis looking toward you with the end of the probe passed out from the utriculus masculinis. This again shows the impossibility of removing the gland without disturbing the utricle and ejaculatory ducts. (The pathologic seminal vesicles, vas ampulla and vasii have no bearing on this paper.)

Fig. 4. Shows a bisected prostate whereby the left half is entirely adenomatous while the right half is myo-adenomatous (adenoma above and myoma below). A suprapubic prostatectomy would likely leave the myomatous portion remaining for a possible future pathologic change to take place.

Fig. 5. Shows a fibromatous prostate. One that would be extremely hard to attack and remove by the suprapubic route, on account of the fibrosis running up and including the seminal vesicles.

well; clipped mucosa with scissors and knife; assisted by assistant's finger in rectum; prostate was finally enucleated; not very large; it showed urethral opening covered with mucous membrane; irrigated with hot salt solution; put in No. 20 (English) tube hooked at right angles with smaller drain; irrigated through urethra and out through drain tube; collodion poured over under the dressing sealing wound; patient returned to bed in Fowler's position; dressing left on for two days unless tube stops up from clot; no irrigation is done if natural drainage is competent; ureteral catheter passed in seven days at which time irrigations are begun.

Zuckerkandl said that perineal prostatectomy was frequently followed by incontinence, fistula, and so forth, and that it was harder to do, while suprapubic left no incontinence nor fistulæ; his reason for changing to the suprapubic method was largely due to the Tandler-Zuckerkandl-Stoerk-Alberans' investigations indicating that the upper bladder (lobus centralis—see cuts) portion of prostate was always the adenomatous portion; his first mortality per cent was greater than in his perineal prostatectomies; it has since been lessened, but is still above his perineal mark.

In discussing the subject of suprapubic prostatectomy with Zuckerkandl, the writer gave argument in favor of the perineal way as follows:

a. The mortality per cent is greater.

b. Partial prostatectomy is done, for according to his illustration (Fig. 1), only the lobus centralis and lobus anterior are removed.

c. Sometimes a mixed prostate is found (Fig. 4) or a fibrous prostate is found (Fig. 5) whereby the prostate and seminal vesicles are fused together. The perineal way would be the better especially in the seminal vesical region.

d. The ejaculatory ducts which are described in Fig. 1 as being behind the field for operation are, in fact, in the majority of hypertrophies, running through the gland, as illustrated in the writer's dissections (Figs. 2 and 3), and would necessarily be disturbed by the removal of the hypertrophy as well as the sinus pocularis,—for the utricle being in the upper floor of the prostatic urethra and the prostatic urethra from necessity having to be in the prostate, the removal of the prostate would take along with it the prostatic urethra and its utricle, because the mucous membrane, on account of inflammatory changes in these cases, is always fixed to the prostatic urethra.

THE BOTTLE OPERATION FOR HYDROCELE OF THE TUNICA VAGINALIS

Ten Cases — Three Failures

By H. H. M. LYLE, M. D., New York City
Associate Surgeon, St. Luke's Hospital

IN order to get the true value of any surgical procedure it is necessary to report the failures as well as the successful cases. In Keen's Surgery, Volume IV, page 607, in describing the "bottle operation," Bevan quotes E. Wyllys Andrews as follows: "I recommend it without reserve, and do not hesitate to urge that it supersede the older operations."

The following is a brief account of our experience with the "bottle operation." In a series of ten cases we have had three failures. The first of these failures could not be justly charged to the operation. The patient had a chronic cardiac condition, which might have been a factor in the passive congestion of the reversed sac. In the second case, the surgical indications for this operation were apparently perfect. The failure was a complete surprise, and led us to think that it was due to some error in technique; as the patient refused further operative treatment, the cause of the increased size of the sac and testicle remained problematic. In the third case, with the previous failures fresh in mind, the operation was carefully and deliberately carried out. The hydrocele tumor disappeared, but its place was gradually taken by a mass composed of thickened sac and testis; this secondary condition was little or no better than the primary. Two months later, the reversed sac was excised by Dr. Douglas; the sac wall, which measured one half inch thick, was composed of œdematous connective tissues.

The patient was shown before the New York Surgical Society, November 8, 1911. The discussion of the case brought out the fact that this operation had failed in the hands of other surgeons. Dr. A. V. Moschocowitz said that he had abandoned the operation on account of failures, and said there was also a good theoretical reason why this operation should not be done. In some cases the testes are fastened to the bottom of the scrotum by the remains of Hunter's ligament; to perform this operation properly, in such cases, the ligament has to be cut. If this has to be done it is just as easy, or easier, to cut the sac away — that is, to perform Von Bergmann's operation.

In the literature, we have found only one reference regarding the failure of this operation. Dr. Vaughan presented before the Washington Surgical Society a hydrocele sac which he had recently removed from a patient, who one year previously had been operated for hydrocele by the buttonhole method. Dr. Vaughan, until the advent of this failure, had always considered this operation proof against recurrence.[1]

The object in reporting these failures is to emphasize the fact that, even in selected cases, the "bottle operation" may give as unreliable operative results as the allied operations of Doyen, Jaboulay, and Winklemann.

[1] Vaughan, Trans. of the Washington Surgical Society, Oct. 20, 1911 Surg., Gynec. & Obst., Feb., 1912, p. 207.

SPECIAL LONG THUMB FORCEPS FOR ABDOMINAL WORK

By JOHN D. SINGLEY, A. M., M. D., Pittsburgh, Pennsylvania

THE instrument was devised and has been used with satisfaction since January, 1908.

Uses: For sponging in deep cavities; for the placing and removal of packing pads; for handling various abdominal viscera, intestine, appendix, ovary and tube, etc.; and as an aid to the accurate passage of the needle in deep cavities, passing the needle through the tissue into the ring end.

Description: The forceps is 9½ inches long. The ends are perfectly rounded, presenting no sharp corners or cutting edges in order that accidental wounding of the viscera may be avoided. The inner aspects of the small ring ends are *finely* corrugated. These corrugations, together with the swelling of the tissues into the lumen of the ring when an intestine or other viscus is grasped, enable the operator to hold firmly without damaging the tissue.

EDITORIALS

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DECEMBER, 1912

THE NEW YORK MEETING OF THE CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

Twenty-six hundred is the official count of the number of registrations at the meeting of the Clinical Congress of Surgeons of North America held in New York, November 11th to 16th. This attendance at a special society easily makes a record of attendance on any single organization of surgical specialists ever before gathered in one body.

The clinical facilities offered by New York and Brooklyn were of enormous proportions. They included every prominent surgeon, every prominent hospital, all the medical schools and all the surgical laboratories. The arrangements were so complete and the clinics and demonstrations so many, that it is estimated that every one of the twenty-six hundred surgeons could have been accommodated, with no more than thirteen at any one meeting place, if they had been equally distributed.

The first day, Monday, no effort was made to distribute the crowd. Hundreds were unable to get into several clinics, while some clinics had few in attendance. This served to demonstrate to those in attendance and to those giving clinics the desirability of distributing and respecting special tickets, in numbers not to exceed the capacity of each place. Beginning with Tuesday, this plan was carried out, and it was so perfectly cooperated in by the various hospitals that the crowd was distributed without the slightest friction, and it resulted in a perfect handling of the great numbers.

The evening meetings, with one exception, were held in the grand ballroom of the Waldorf-Astoria Hotel, which, when filled to its capacity, accommodates three thousand. The place was packed each evening. The programs were of the most interesting nature, and it was noticeable that not one who had been asked to participate failed to respond.

Thursday was known as Brooklyn day and, on that evening, the literary program was held at the Academy of Music, Brooklyn. The attendance at this meeting was over three thousand men, this including invited guests from the Kings County Medical Society.

The business meetings, two in number—one Tuesday evening at five o'clock and the other Friday evening at five o'clock—transacted the regular routine business and passed upon the following items of importance, which

will be taken up more in detail in the succeeding pages, viz.:

I. Confirming and approving the action of the Editor of the official journal of the Congress, SURGERY, GYNECOLOGY AND OBSTETRICS, in organizing an International Abstract of Surgery, and negotiating reciprocal relations between the abstract department of SURGERY, GYNECOLOGY AND OBSTETRICS, and the *Journal de Chirurgie* of France and *Zentralblatt für die gesamte Chirurgie und ihre Grenzgebiete* and *Zentralblatt für gesamte Gynäkologie, Geburtshilfe und ihre Grenzgebiete*, of Germany.

II. The appointment of a committee by President Edward Martin to consider the advisability of establishing a minimum requirement for surgery, and, if it is deemed advisable, adopt a method by which a supplementary fellowship or degree shall be conferred upon graduates in medicine who have fulfilled the requirements of the committee.

III. The appointment of a committee of five to formulate and execute a plan of education among the laity and the general practitioners on the subject of cancer.

IV. The appointment of a committee of five to consider the advisability of attempting the standardization of hospitals.

V. A motion by John B. Murphy, asking the executive committee to consider the advisability of limiting the membership of the Congress to two thousand members.

I

THE CONGRESS BACK OF THE INTERNATIONAL ABSTRACT OF SURGERY

The Editor of SURGERY, GYNECOLOGY AND OBSTETRICS laid before the business meeting of the Congress the plans for enlarging the journal, as outlined in the editorial on this subject in the November number of the magazine. The suggestion for the new International Abstract of Surgery was received with enthusiasm by the members of the Congress, and the following resolutions, presented by J. Bentley Squier of New York and unanimously passed by the meeting, formally approved of the work of the Editor and authorized a continuance of the effort.

Whereas, Franklin H. Martin, Editor of the official journal of the Clinical Congress of Surgeons of North America, has entered into certain agreements with the editor and publisher of the new ***Zentralblatt für die gesamte Chirurgie und ihre Grenzgebiete*** and ***Zentralblatt für die gesamte Gynäkologie, Geburtshilfe und ihre Grenzgebiete***, which have been authorized by the German Surgical and the German Gynecological Congresses, respectively, and the editors of the *Journal de Chirurgie* of Paris, France, for the purpose of establishing an International Abstract of Surgery, which shall be a supplementary journal to SURGERY, GYNECOLOGY AND OBSTETRICS;

Be it Resolved that we, the accredited members of the Clinical Congress of Surgeons of North America, at its annual meeting for the transaction of business, do hereby commend and confirm the agreements and understandings entered into with these foreign organizations, and further wish to emphasize our loyalty and support to this new progressive enterprise of the editors of our official journal.

II

AMERICAN COLLEGE OF SURGEONS

Franklin H. Martin of Chicago, in urging upon the Congress the advisability of devising a means for the standardization of surgeons in the United States and Canada, made the following remarks and presented the accompanying motion:

"The spontaneous success of the Clinical Congress of Surgeons of North America, which

in its third session has eventuated in an attendance of 2,600 surgeons, and which has on its list of members 9,000 names, demonstrates that something was needed in medical societies which this movement has supplied.

"Its unprecedented success places a great responsibility upon those who were instrumental in its conception. Personally, I feel that it presents great opportunities if the efforts of its organization are judiciously directed.

"It has solved in its three great meetings the primary object for which it was organized, viz.: providing for its members the greatest of clinical opportunities.

"Through the editors of the surgical publication, by the invitation of which the first Clinical Congress was made possible, it has a plan (as was explained to you at the general meeting on Tuesday) by which a comprehensive journal of bibliography and abstract surgery will be established. At this time I wish to enlist the influence of this great organization of surgeons in a new effort, that will not only serve ourselves, but that will aid people who from time to time look to us for surgical guidance.

"To be more definite, I believe that this largest organization of surgeons on the American continent, the Clinical Congress of Surgeons of North America, should assume the responsibility and the authority of standardizing surgery.

"This can begin at once by this body authorizing the appointment of a thoroughly representative committee, which committee shall have the power to act alone or in conjunction with other committees that this committee may invite to join them, along the following lines:

"First—It should formulate a minimum standard of requirements which should be possessed by any authorized graduate in medicine, who is allowed to perform independently surgical operations in general surgery, or any of its specialties.

"Second—It should consider the desirability of listing the names of those men who desire to practice surgery, and who come under the authorized requirements.

"Third—It should seek a means of legalizing under national, colonial, state or provincial laws, a distinct degree supplementing the medical degree, which shall be conferred upon physicians possessing the requirements recognized by this law as necessary to be possessed by operating surgeons.

"Fourth—It should seek co-operation with the medical schools of the continent which have the right to confer the degree of M. D., under the present recognized standards, and authorize these colleges to confer the supplementary degree of surgeons on each of its graduates who have, in addition to their medical course, fulfilled the necessary apprenticeship in surgical hospitals, operative laboratories and actual operative surgery.

"Fifth—It should authorize and popularize the use of this title by men upon whom it is conferred, and its use should especially be urged in all directories of physicians, in order that the laity as well as the medical man can distinguish between the men who have and the men who have not been authorized to practice surgery.

"In suggesting this innovation, I appreciate the practical difficulties that will arise in carrying it to a successful execution.

"The difficulties can be surmounted, however, by a committee of this body backed by this organization, if the plan is worth while.

"I believe that the time is ripe for a concerted action on the part of the great body of thinking surgeons of this Continent, to insist that the surgeon of the future shall be not only thoroughly educated in the science of medicine, but that he shall have a thorough training in the technique of surgery under the direction of a practical surgeon before he is legally or morally allowed to operate upon the public.

"This is not, it seems to me, open to argument. This will protect unsuspecting patients who have no way of discriminating between trained surgeons and the tyro. It will protect the would-be surgeon against his own inexperience, and it will protect and put a premium where it belongs—on the conscientiously trained surgeons.

"How shall we begin? We have in this body all the machinery and the talent that is

necessary to make a successful campaign in establishing this reform.

"Remember, in every congressional district in the United States, and in every parliamentary constituency of Canada, we have a representative surgeon in his community, who is a representative of this Congress. Besides, in each State of the United States, and each Province of Canada, we have two surgeons, who have been chosen by their confrères as prominent in these large communities, as representatives-at-large of this Congress. These men stand for real surgery, and each one will gladly co-operate with a committee from this Congress in making more valuable and honorable his position before his public and before his fellow-practitioners, by urging proper legislation through the co-operation of his neighbors.

"There is not a special surgical society in this country or Canada that will not welcome an opportunity to co-operate, through committee or individually, with a representative committee from this great continental organization of surgeons.

"Believing this to be true, I move, Mr. President, that you be authorized to appoint a committee of nine members of this organization, of which the President and President-elect shall be added ex officio, to consider the advisability of taking up this subject, and with power to act in any manner the committee may wish, and to report to this body at the next meeting of the Congress."

This motion of Franklin H. Martin's was seconded by John B. Murphy of Chicago, who supplemented it with a very enthusiastic talk. The motion was unanimously adopted.

President Edward Martin appointed the following committee of nine; which has added to it the President, Edward Martin, ex officio, Philadelphia, and President-elect, George Emerson Brewer, ex officio, New York.

RUDOLPH MATAS, New Orleans,
W. W. CHIPMAN, Montreal,
JOHN M. T. FINNEY, Baltimore,
FRANKLIN H. MARTIN, Chicago,
ALBERT JOHN OCHSNER, Chicago,
EMMETT RIXFORD, San Francisco,
JOHN B. MURPHY, Chicago,
F. J. COTTON, Boston,
C. H. MAYO, Rochester, Minn.

III

The Chairman of the Committee on the educational campaign on cancer, Thomas S. Cullen, will treat the subject editorially in this journal in the January number.

IV

The subject of standardization of hospitals will also be treated editorially in an early number of the journal.

V

The question of limiting the membership of the Congress will receive careful consideration by the Executive Committee and as soon as a decision has been reached it will be announced editorially.

TRANSACTIONS OF SOCIETIES

THE SIXTH INTERNATIONAL CONGRESS OF OBSTETRICIANS AND GYNECOLOGISTS

BERLIN, GERMANY, SEPTEMBER 9 TO 13, 1912

THE sixth session of the Congress opened most auspiciously under the patronage of Her Most Gracious Majesty, the Kaiserin and Koenigin of Germany. The German Government extended the courtesy of granting the use of the Herrenhaus (Senate House) for the scientific sessions, and then the meeting opened at eleven o'clock, Monday morning, September 9th, with an attendance of three hundred delegates. The meeting room is situated in the center of an immense structure, its walls and ceiling being paneled throughout with solid butternut wood, and lighted by skylights of stained glass. The desks and seats of the same wood, arranged similarly to those in the Senate House in Washington, were most comfortable and convenient. The acoustic properties were excellent. This room is entirely surrounded by a wide hall with committee rooms opening off, which were used for the pathological exhibition and display of surgical instruments and appliances.

The President then made formal announcement of the general program of the meeting. Prominent among these was the report of the organization committee. This brought forth the announcement that a most cordial invitation had been extended to the Congress by the united gynecologists and obstetricians of all the national organizations of the United States and Canada to hold its next regular meeting in New York in 1915. The committee recommended the acceptance of this invitation and nominated Dr. J. Riddle Goffe of New York as president. This received the unanimous approval of the Congress.

In accepting the presidency, Dr. Goffe assured the Congress in impressive words of his heartfelt appreciation of the signal honor that had been so unexpectedly conferred upon him and upon his country. There is no city, no nation to which this Congress comes without bringing an irresistible impulse for renewed effort and better work. It is a great engine of progress. He was therefore especially happy that his country was to be favored with this great uplift. He assured the Congress of a most cordial welcome and the best hospitality the country affords.

The scientific program was divided into three distinct parts: First, the treatment of the peritoneum in abdominal and pelvic operations; second, the surgical treatment of uterine hæmorrhage during pregnancy, delivery, and childbed; and third, individual communications on miscellaneous themes.

In the discussion of the first theme, twelve full papers were read, twenty-one papers in abstract, and twenty-four participated in the general discussion. In the second theme, ten full papers were presented and twenty-three took part in the discussion. Miscellaneous communications were contributed in abstract to the number of fifty-three. A partial abridged report follows:

THE TREATMENT OF THE PERITONEUM IN ABDOMINAL AND PELVIC OPERATIONS

H. BROUHA (*Belgium*): The mechanical irritations of the peritoneum are usually dangerous. Even if they are reduced to a minimum by the perfection of operative method, they should not be feared if it is a question of completing hæmostasis, finishing the sutures and cleaning the peritoneum from the matters that have appeared during the operation. It is advisable to use dry compresses and sponges; the contact of the latter with the peritoneum must not be exaggerated. The Mikulicz tamponade should be retained as a makeshift. Resorptive threads should be preferred for the bindings and sutures in laparotomy.

The peritoneum should be dry cleaned; washing

with physiological solution (Nael 9%) is more dangerous than useful. All antiseptics should be avoided with the exception, however, of a weak iodine tincture, which may serve for touching the stumps and the suspicious points. Most Belgian gynecologists have no experience respecting the prophylactic value of the intraperitoneal camphor oil injections. On the other hand several of them have used with success the oxygen process of Professor Thiriar of Brussels after suspicious laparotomies.

Every modern surgical clinic should possess two operation rooms: one for aseptic and the other for septic cases, with separate personnel and separate arrangement. The use of gloves, particularly rubber gloves, forms a real advance in the prevention of operative infection.

It is particularly important to leave the peritoneal serosa entire and dry after the operation. For this purpose (a) the field of operation is to be carefully isolated by means of compresses, (b) the stumps and the surfaces uncovered by serosa are to be peritonized with the greatest care, (c) hæmostasis is to be fully secured.

If the peritonization is not possible, or if complete hæmostasis cannot be attained, the remaining tamponade by means of sterilized dressing wadding retains its entire value as the only means either of stopping hæmorrhage or of limiting the infection during the first few hours after the operation. The drainage of the peritoneum by means of rubber, glass or silver tubes is generally given up.

The methods of preventing operative infection by injection of various products (camphor oil, nucleinate of soda) into the peritoneum have not yet been subjected to sufficient control by practice. The oxygen process of Prof. Thiriar of Brussels is recommended very particularly to the attention of gynecologists. In the cases of post-operative peritonitis it is finally necessary to repeat the operation as soon as possible.

L. MEYER (*Copenhagen*) emphasized the following points: To wash out the peritoneal cavity is only recommendable in cases of bigger and coarser foreign bodies (i. e., pieces of food; fæces). In nearly all other cases a dry cleaning is preferable to a wash out.

A very strict cleaning of the peritoneal cavity, especially for blood, is not necessary. It is of no use and even hurtful to try to drain the peritoneal cavity, if the process is not quite limited and shut off by adhesions. It is not necessary to lay great stress on the "peritonealization" of wounds in the peritoneal cavity, especially not if this necessitates a fixation or greater dislocation of intestines. It is far more preferable to shut out bigger wounds in the pelvic cavity from the peritoneal cavity and to drain them per vaginam together with the subperitoneal connective tissue.

K. FRANZ (*Berlin*) followed with a very elaborate paper:

KINDS OF PERITONEAL WOUNDS

The wounds made when opening the abdominal cavity during an operation are cuts or surface sores. The surface sores arise through detaching agglutinated or adhering tumors and organs. Among surface sores may be included such injury to the serosa as is not visible to the eye, which is caused by physical, chemical or thermic irritation. As in every cœliotomy one of these irritations comes into effect, it may be said that cuts of the peritoneum and surface sores are always found together.

As in the case of all wounds, hæmorrhage and infection come into consideration in the treatment of peritoneal wounds. The hæmorrhage of peritoneal wounds is usually so slight that it does not need to be treated as such. The case is different with infection, which renders wounds of the peritoneum particularly complicated and makes their treatment more difficult.

THE INFECTION OF PERITONEAL WOUNDS AND ASEPSIS OF THE OPERATION

Every peritoneal wound is to be considered bacteriologically as infected. All investigators who have examined the peritoneum bacteriologically after operations have found bacteria. It is impossible to conduct an operation entirely free from germs. In most cases the germs thus introduced are not harmful, for (a) they attain the peritoneum in too small a number, (b) they are not virulent, or (c) they are destroyed by the protecting forces of the peritoneum.

In order that germs may only enter the abdominal cavity in a small number and may not be virulent, the strictest asepsis during the operation is necessary.

The principal danger to the peritoneal wounds is threatened by germs situated in the body of the patient herself (own germs), i. e., in twisted necrotic ovarial tumors, in decayed myomes, in adnex tumors, in carcinoma of the uterus, and further by germs of the intestines and the bladder. The germs of the intestines are particularly dangerous, as even in the case of superficial injuries to the serosa they grow through the wall of the intestines, or in the case of paralysis of the intestines may penetrate through the wall of the intestines.

The dangers threatened by the germs emanating from the patient herself can be removed or diminished by the skill used in operating. It is impossible to destroy these dangerous bacteria by chemical disinfectants. At most it is possible to reduce the virulence of the germs of the vagina or those situated on the surface of a collum-carcinoma, if not to kill them or remove them entirely. For this purpose 70 per cent alcohol or iodine tincture is suitable.

PERITONEAL INFECTION

The course taken by peritoneal infection depends first, on the extent of the wounds (the greater the surface of the wound, the greater is the danger of infection); second, on the kind, number, and

virulence of the germs introduced (the most dangerous for the peritoneum are streptococci and the bacterium coli); third, on the duration of the effect (if a very large quantity of very poisonous bacteria get into the peritoneum at the same time, a general fatal poisoning will be the result. If virulent germs enter the abdominal cavity gradually in batches, the first will be destroyed, but gradually the protective arrangements of the body will be injured, and in this case also fatal infection will result); fourth, on the power of resistance of the organism and the bactericide qualities of the peritoneum itself (the stronger and healthier the person is, the more certainly will even grave infections be overcome. General weakness, particularly if caused by malignant tumors, reduce the power of resistance of the organism against peritoneal infection. Typical examples of this are the frequent peritonitides after operations for carcinoma).

REACTION OF THE PERITONEUM AGAINST INFECTION

The peritoneum is capable of great resistance against infection. It overcomes infectious matter which the connective tissue is unable to overcome. An example of this is found in the abscesses of the abdominal integument after laparotomy. The bacteria which form the abscess were quite certainly also on the peritoneum. But it destroyed them without any reaction being clinically observed, while in the connective tissue of the abdominal integument they led to suppuration. The case is similar with the abscesses in the subserous connective tissue after vaginal total extirpations.

The processes of the protective action of the peritoneum against infection are very complicated; they result (a) from resorption, (b) from the bactericide qualities of the exudation of the peritoneum.

a. By means of resorption the bacteria are received in the course of the lymph and of the blood and destroyed. Resorption takes place in all parts of the peritoneum, but particularly on the diaphragm, where the germs are conducted by the peristalsis and the movement of the diaphragm. Resorption does not, however, play a very important part in the destruction of bacteria. It only overcomes few bacteria and none of a very virulent nature. On the other hand it contains a great danger, as the reception of very virulent bacteria into the circulation may soon lead to the poisoning of the body.

b. The principal struggle against infection certainly takes place at the part infected. The peritoneum, irritated by the bacteria, supplies an exudation with leucocytes which destroys the bacteria.

EXECUTION OF THE TREATMENT OF PERITONEAL WOUNDS

From the above mentioned facts the following principles for the technical treatment of peritoneal wounds may be deduced:

For stitching peritoneal wounds resorptive material, i. e., catgut, should be used. In non-resorptive material, particularly in silk, bacteria can become established and spread infection.

The abdominal cavity should be opened with as small cuts as possible. The smaller the cuts, the more will the intestines be preserved. Transverse cuts are better than longitudinal ones. The transverse cut uncovers the upper sections of the abdomen better. Vaginal operations are to be preferred to abdominal ones when they can be executed well from a surgical point of view.

The upper abdomen must be covered with dry cloths so that if the pelvis is raised no liquids can flow upwards, and if the position is horizontal no intestines can fall forward. Dry cloths are more aseptic than wet ones. If they have become damp from the peritoneal liquid they should be removed.

In order to protect the intestines, good narcosis is necessary. If the intestines are pressed forward during the narcosis they become injured, more liable to infection and less capable of resisting it. The lumbar anæsthesia is very particularly suitable for gynecological laparotomies, because it slackens the abdominal integument well, renders very small cuts possible, permits the intestines to be brought well back, and seldom causes vomiting.

All kinds of disinfectants are to be avoided in the abdomen on account of the danger of poisoning and the injury to the serosa. The operation should be carried out also with dry hands, or dry rubber gloves—not with hands that are dripping with disinfectants.

Blood, cystic fluid, amniotic liquor, and pus must be kept away from the abdominal cavity, and if they have entered must be carefully removed. It is not important, however, to remove them to the very last drop. That would unnecessarily prolong the operation and injure the serosa mechanically. It is not advisable to rinse the peritoneum with salt to remove the remains of these substances.

Care must be taken that peritoneal wounds do not secern into the free abdominal cavity, i. e., all parts free from serosa must be carefully covered with peritoneum. If there are large surface wounds for which there is not sufficient peritoneum, attempts must be made to cover them with epiploön or other suitable organs, or the secretion must be conducted outside by means of a gauze drain for the first few days after the operation. For this purpose a hole in the back vault of the vagina is specially suitable in the case of gynecological operations. Intestine stitches must be made with particularly great care. The cauterization of large secerning peritoneal wounds with a red-hot iron is not to be recommended. Echars dispose to infection and to agglutination.

Dead spaces behind peritoneal stitches must have a discharge to the outside, otherwise, on account of the engorgement of the secretion, they lead to the formation of abscesses and frequently to peritonitis.

The drainage of the peritoneal wounds should be carried out as seldom as possible. A drainage of the free abdominal cavity is only possible in the case

of ascites, because the chronically diseased peritoneum secerns continually and prevents agglutinations of the intestines. If the free abdominal cavity is drained otherwise, the enclosing of the drain is the immediate result. There is, therefore, no object in draining the free abdominal cavity if pus has entered. It should only be drained if large secerning peritoneal wounds cannot be completely covered and particularly if these wounds are smeared over with pus. The drainage should be made through the abdominal integument only if it is not possible to drain to the vagina. In this case the Mikulicz bag is to be recommended. In any case gauze drainage must be made; rubber or glass drains do not lead off sufficiently.

PROPHYLAXIS OF PERITONITIS

The prophylaxis of peritonitis is, in the first place, not advisable for human beings. In experiments with animals a protection against peritoneal infection has been obtained by injecting salt solution, aleuronate, peptone, nuclein acid and oil into the abdominal cavity. Certain proofs from a surgical point of view are lacking for the benefit of such prophylactic measures for human beings. They are not, however, unobjectionable.

H. MACNAUGHTON-JONES (*London*) presented a paper based upon a full report compiled from the views of 67 of the leading obstetricians and gynecologists in the United Kingdom:

Mechanical irritation of the peritoneum, instrumental or manual, under strict aseptic methods, if not unduly prolonged, or roughly carried out, does not lead to inflammatory or exudative processes.

There are antecedent conditions, local and constitutional, which predispose to such processes, and to the presence of bacteria, both during and after operation, which are inimical to the normal reaction of the peritoneum. These conditions are fully dealt with in the report.

The introduction of bactericides or any irritative chemical fluid into the peritoneal cavity is always to be avoided if possible. If introduced, the nature of the agent and strength chosen must be such as to be readily tolerated by the peritoneum. Sterilized physiological saline solution is the best medium for cleansing the peritoneum.

Dry treatment of the peritoneum is regarded by most surgeons as preferable to moist. This does not exclude mopping and wiping dry with dabs wrung out of warm saline or other solution. Lavage, tamponade, and drainage are at best necessary evils, always to be avoided when possible. The tamponade has special risks associated with its employment. The indications for the resort to each procedure and its special danger are included in the report.

The nature and character of the material selected for ligatures and sutures must be chosen according to the purpose which it is designed to fill. Ceteris paribus, within the peritoneal cavity absorbable material is preferable to unabsorbable, and the strength should be duly proportioned to the demand made on it. Catgut of various strengths would seem to answer most purposes required. A number of surgeons prefer silk, linen thread or "celloidinzwirn" for ligatures or vessels. By one surgeon the danger of tetanus arising from the use of catgut has been noticed. Brief reference is made in the report to the reasons advanced for the preference of one kind of material over the other, and also to the methods adopted for securing complete sterilization of each kind. Imperfect sterilization and retention of unabsorbable material are decided elements of danger.

Pus, blood, or cyst contents, if allowed to remain in the peritoneal cavity, are sources of irritation, exudation, and peritonitis.

Under the term "asepsis," applied to operative interference, we have to include everything from the previous preparation of the patient up to the close of an operation; surroundings, operator, all assistants, as well as the material, instruments, and appliances employed. In the presence of factors predisposing to irritation, asepsis also involves the prophylactic steps which should be taken to prevent their injurious action and effects. It must also embrace the best means of treatment of any untoward accidents and complications which are met with during, or are the immediate consequences of, the operation. Such details are briefly referred to in the report. Asepsis can never be secured without complete hæmostasis, and deliberate peritonization of all exposed surfaces. Disinfection of the contents of the bowel after operation by the administration of such a disinfectant as Cyllin is also of importance.

Gonorrhœa, having an important relation to inflammatory processes which involve the pelvis and may spread to the general peritoneum, has to be specially considered in view of such possible spread, as also, the most judicious surgical course to be adopted to prevent this. This is included in the report.

P. LECÈNE (*Paris*): We think we have succeeded in demonstrating in our report that the best method of treating the peritoneal wound caused by the physician, in order to avoid infection, is to treat it both aseptically and physiologically at the same time: aseptically, that is to say, by reducing the infection during the operation to an absolute minimum and by attempting with all possible means to reduce the endogenous infection, which latter is always more difficult to combat; physiologically, that is to say, by sparing the natural means of defense of the peritoneum and by re-establishing at the end of the operation as normal a disposition of the serosa as possible in order to permit it to combat efficaciously any infection which, in spite of all the care taken, may have been produced.

The great progress realized in peritoneal surgery in the last ten years appears to be due to the following various factors:

A better choice of the moment, the nature, and the extent of the operation in each case.

Systematic use of rubber gloves sterilized in the autoclave.

Realization of strict asepsis during the operation, together with limitation of the field of operation.

Exact peritonization of the cruent surfaces with or without exclusion of the smaller pelvis.

More judicious indications and better realization of drainage, when this is required.

RESINELLI (*Florence*): The toleration by the peritoneum of physical, chemical and biological irritations can be studied by three different groups of observations: (a) Cases of spontaneous or traumatic discharge of physiological and pathological material, such as gall, urine, contents of the stomach and intestines, liquid from ovarial tumors, blood, pus, etc., into the peritoneal cavity; (b) cases of grave wounds by firearms or sharp weapons, and (c) cases of surgical intervention.

From the sum of these observations, and with the assistance of the results acquired from experiment on animals, we can arrive at general provisions for laparotomic operations:

The physical irritations which may affect the peritoneum are of a thermic or mechanical nature. The peritoneum is very sensitive to cold, particularly if a great part of it is uncovered through the windings of the intestines coming out; such a chill is not only due to the irradiation of heat in the operation room, but particularly to evaporation; the influence of the chill is felt specially in the heart. This can be prevented by the Trendelenburg position, by protecting the windings of the intestines by means of compresses in the abdomen, by Pfannenstiel's incision, and by limiting the longitudinal incision as far as possible. The peritoneum shows itself to be capable of great resistance against mechanical irritations in so far as they are only of a surgical nature. Clinical and experimental observations prove that the endothelium regenerates very rapidly, that its lesions generally produce no adherences, and that even defects and interruptions of continuity, in so far as they are aseptic, heal up quickly. For a successful operation it is, however, required that the pelvic abdominal cavity is exactly closed up by the peritoneum at the conclusion of the operation, especially if the vagina has been opened. While recognizing the harmlessness of mechanical irritations for the peritoneal surface, nevertheless in my opinion moist compresses are to be preferred to dry ones, also because by using the former a cause of chill, however slight it may be, is obviated. The capacity of resisting mechanical irritations also makes itself noticeable with regard to the stitching material, and therefore I think I must give the preference to silk because it can be sterilized with greater facility and certainty and is capable of greater resistance; it also permits one single material to be used and thus simplifies the operation.

The peritoneum shows a smaller toleration of chemical irritations and particularly of disinfecting liquids. It is evident that in aseptic forms disinfectants are to be excluded; but in the case of operations in doubtful or decidedly infectious cases the penetration of antiseptic liquids into the peritoneum is always harmful, because they may alter the endothelia, diminish the capacity of resistance and cause toxic symptoms, without in any way, or only to a small extent, influencing the germs of disease.

The means hitherto proposed for local prophylaxis against peritoneal infections are not free from all criticism. Drainage into the free abdominal cavity, although it is in rare cases indicated and even useful, should nevertheless be only used quite exceptionally. Rinsings of the abdominal cavity with physiological solution is of doubtful efficaciousness and may further increase the dangers of the operation. Preventive injections of camphor oil into the abdominal cavity complicate the operation, all the more so as the mortality through the operation is only to a small extent due to peritonitis, and moreover they do not represent any progress; their efficacy in the sense of reducing the morbidity and mortality of the operation has not yet been proved. The results of my experience, particularly respecting abdominal panhysterectomy by carcinoma colli uteri, entitle me to recommend hypodermoclysis with nucleinate of soda as the most effective means for increasing the capacity of resistance of the organism in general and of the peritoneum in particular.

The necessity of an exact asepsis in laparotomic operations remains incontestable, but success depends principally on precision and the progress of operative method.

B. J. KOUWER (*Utrecht*): In clean cases the results of abdominal section are equally dependent on operative technique as on antiseptic measures. The different modern methods of antisepsis generally are perfectly sufficient for the disinfection of the skin, both of patient and of operator. Most of these methods suffer from a certain degree of exaggeration. The peritoneum is but little sensible to the germs of the air, even under conditions apparently very unfavorable.

For the results of abdominal section in pure cases, operative technique is far more important than antiseptical measures. Perfected technique aims in itself at avoiding any possibility of infection of the surrounding peritoneum by the infected part and thereby becomes the real asepsis, superior to chemical, thermical and mechanical asepsis. Moreover the abdominal cavity will strongly be protected by damming up with dry sterilized gauze in many layers.

Draining is not and cannot be the intention in well-done operations, neither so-called tamponade, which suggest the effect of pression: "peritoneal dressing" is a far more appropriate term.

The connective tissue is more inclined to infection than the peritoneum: pelvic cellular tissue, in precise operating, is chiefly endangered by the vaginal contents, on the other hand the well-cleansed open vagina is its best protector after operation.

The abdominal wound has to be protected against

mechanical injury (stretching of too small incision by abdominal refractors), and needs sufficient surgical cleanliness. The personal character of the operator marks the special character of his technique and his asepsis, and therefore also his operative results.

JOSEF LOVRICH (*Budapest*): The most important points of my experience, collected through case-material at the First Budapest Clinic for Women, are as follows:

The patient should be carefully observed clinically before the laparotomy is made. Of great importance is an examination of the blood, which should never be omitted before any laparotomy.

This blood examination has proved of great value, especially in myoma-cases or in suppurating adnex operations.

A myoma patient should not be operated upon if the amount of hæmoglobin has sunken below 40; myoma operations may be safely postponed until the quality of blood has improved.

We always make it a point to evacuate the intestines thoroughly before an operation; we have never found these proceedings disadvantageous.

It is a conspicuous fact that, in many cases, hidden cysts which contain vast amounts of germs are found during an operation.

There also may exist a medium grade pyelitis, without apparent symptoms or discomfort to the patient. Weakly patients are given good nourishment and digalen a few days before the operation, the latter in small doses. Also sleep is insured before the operation is made by exhibiting veronal. During menstrual congestion it is much harder to overcome hæmorrhages, besides there always remains a possibility of parenchymatous hæmorrhage. We therefore operate during menstruation only in cases where postponement is impossible.

On the day of operation, the patient is given 0.5 g. veronal at an early hour. Immediately before the laparotomy, before the abdominal skin is prepared, the bladder is washed out and the vagina is disinfected.

During the operation asepsis is the main factor. Tampons, sponges, operation garments, face-masks, and cuffs are sterilized at 135° C., gloves at 110° C., during one half hour.

During the operation the only sewing material used within the abdominal cavity is thin catgut, which we prepare ourselves.

The field of operation is prepared and cleansed by: Soap, lukewarm water, acetone-alcohol, 5 per cent tincture of iodine.

The operating surgeon who has opened the abdomen also has to close it again.

The opening is made large enough to make sufficient space available for the operation.

High pelvis position, according to Trendelenburg, is never made. All arteries are ligated singly. Every wound of the abdomen is covered by peritoneum. In cases where a doubt arises during the operation concerning complete asepsis, the Douglas' cavity is drained by means of iodoform gauze. Drainage may be obtained upward or downward, according to the practical needs of the case. However, in cases where the vagina cannot well be disinfected, be it through diseases of the vulva, vagina, etc., or where the upward drainage appears to be more simple, for instance, in one-sided extirpations of the adnexes, a strip of gauze is simply placed within the lower angle of the abdominal wound. The small opening often closes spontaneously, but may be closed by a few stitches later on and united with the main suture.

In cases of Wertheim's operation, both parametria are drained by means of two narrow gauze strips, also the abdomen is drained by means of gauze, which in such cases is conducted downward by means of a hole the size of a small coin cut into the wall of the posterior vaginal cavity.

The peritoneum is always treated dry; if purulent operations are performed no rinsing is employed. In such cases only "Locke's solution" is poured into the abdominal cavity, but only if the loss of blood has been considerable and the pulse has become small on account of this loss. Oil (according to Glimm) or sugared water (according to Kuhn) we never employ. If possible, no blood is left within the abdominal cavity.

We consider it of importance to induce peristalsis within 24 hours after the operation. "Peristaltik Hormon" is a splendid medium for this purpose, but the best results we obtained by means of a wine-glycerin-clysma. The patient is allowed to move in bed, even right after the operation; feet and lung gymnastics are employed during nursing the invalid; we likewise administer oxygen and digalen. In most cases, the patient has no desire to rise from bed after the first few days of a laparotomy, and we do not encourage their rising. Eight to ten days after the operation, when the sutures have been removed, the patients may rise and leave the clinic.

During the period from March 1, 1903, to January 1, 1912, 960 cœliotomies were performed at the First Budapest Clinic for Women.

	Died	Per ct.
Of these operations 101 were performed by way of the vagina	6 =	5.9
Abdominal operations were performed to the number of 859	74 =	8.6
Total: Cured, 880 =		91.7

WERTHEIM (*Vienna*): The greatest possible preservation of the peritoneum (avoiding mechanical, chemical, thermic injury).

The cleanest and driest possible work and particularly the removal of all tissue material becoming necrosed.

The covering of all defects of the serosa with peritoneum.

Corresponding treatment of the subperitoneal spaces; avoidance of retention by keeping them open (if possible per vaginam).

The seclusion also of intraperitoneal places, if they are infected or suspected of infection. When

this is impracticable, by covering them with peritoneum on account of the lack of the latter, the place to be excluded must be filled up with gauze, with a view to enclosing and open treatment which may possibly be necessary.

JOSEPHSON (*Sweden*): If pus escapes during laparotomy, the character of this pus should also be determined by microscopic examination by placing some of this pus on the microscope plates under the laparotomist, afterward however being strictly guided by the result of this examination.

For abdominal cavity drainages in laparotomies, the best remedy is sterilized liquid of Locke, warmed (37.8° C.), the composition of which is changed according to the amount of mineral salts in the human blood.

OSKAR BEUTTNER (*Geneva*).

SUMMARY OF THE CONCLUSIONS IN RESPONSE TO INDIVIDUAL QUESTIONS

Do you work with damp asepsis? (Eventual results.) Ileus? Do you work with dry asepsis? (Eventual results.) Ileus?

Sixteen colleagues operate exclusively with "damp" asepsis, ten colleagues operate conditionally with "damp" asepsis, three colleagues operated formerly with "damp," but operate now with "dry" asepsis, twenty-one colleagues operate with "dry" asepsis.

The results are the same whether the operation is made with "damp" or "dry" asepsis.

No fundamental difference can be recognized between the two methods (damp and dry asepsis).

The only difference between the two methods consists in the fact that in the case of "damp" asepsis the gauze compresses are saturated "ante operationem" with physiological salt solution, whereas in the case of "dry" asepsis this saturation takes place during the operation and the saturating liquid is supplied by the body itself (peritoneal secretion, ascites, blood, contents of cysts, pus).

How do you limit the sphere of operation?

All operators recognize the necessity of limiting the sphere of operation. This limitation must in the first place, as far as possible, prevent the contact of the surface of the body with the cavum peritonei, and in the second place must see to it that further sections of the peritoneum are not affected by any primary seat of infection which happens to exist.

The means of fulfilling these demands are different according to the different operators; they relate to the manner of fixing and applying sterile cloths, compresses, etc., either on the skin of the abdomen or "in abdomine" itself; further, the manner of opening the peritoneal cavity must be considered (large incisions, longitudinal or transverse laparotomy), and also the stability of the abdominal cavity compresses when they have once been placed in position.

In conducting the operation (extirpation of purulent adnex tumors, of fibromes, of intraligamentary tumors, etc.) do the operators consider that as little as possible of the healthy peritoneum should be spared?

Forty-five of the colleagues are in favor of sparing the peritoneum as much as possible during operations; ten colleagues preserve the peritoneum only in so far as this does not interfere with "convenient" or "quick" operation; one colleague only attaches no importance to the preservation of the serosa.

What principles, what method of execution do you follow in closing peritoneal wounds and defects? Have you an operative procedure of your own?

All operators emphasize the necessity of a more or less exact peritonization of the pelvic cavity.

Attempts should be made to close the peritoneal wounds as exactly and directly as possible.

In case large peritoneal defects are to be filled up, the organs that are covered with serosa in the vicinity are drawn near; at times even an epiploön transplantation is carried out.

Typical peritoneal plastics are not much reported; more attention should be devoted to them in future; in particular special principles, which come into consideration for pelvic peritonization, should be more thoroughly studied.

Do you operate without or with gloves and in what manner?

Thirty colleagues always operate with gloves. In two cases they merely state "with gloves;" in four cases we find the thread glove used exclusively and in ten cases the rubber glove. Fourteen operators use the rubber glove with the thread glove over it, or for septic cases the former alone and for aseptic cases the latter.

Twenty colleagues operate without or only "conditionally" with gloves; one makes the remark "almost always without gloves"; five colleagues make no use of gloves, and fourteen use them only for septically suspicious cases.

Out of fifty operators, therefore, forty-four (or forty-five) wear, unconditionally or conditionally, gloves.

The results of the colleagues operating with or without gloves are fairly similar in so far as septic cases are taken into consideration.

What stitching material do you use for the intraperitoneal operations?

Seventeen operators use some kind of catgut; six operators use exclusively silk; two operators use thread, and twenty-five operators use different materials, mostly silk and catgut.

For closing peritoneal wounds and in cases that are not clean, iodine catgut is preferred.

For tying up the vessels (uterinæ, etc.), a more solid ligature material is preferred (silk and thread).

For aseptic conditions and for the intestine suture, finest silk (sublimate silk) is recommended.

Do you use prophylactic camphor-oil?

Thirty-five operators answered simply "No"; one operator occasionally makes a prophylactic oiling; fourteen operators use the oiling in definite cases immediately before closing the peritoneum.

The verdict respecting the use of prophylactic camphor-oil in Switzerland is therefore by no means yet concluded. While one has seen no success to arise from it, another would "under no circumstances now like to do without it."

The fact is that the oiling is used fairly seldom for purely prophylactic purposes, and oftener before the closing of the peritoneum, particularly after abdominal radical operation for uterus cancer, after very lengthy or unclean operations, or after the bursting of a purulent seat.

Do you use abdominal tamponade: (a) to stop parenchymatous, peritoneal bleeding, (b) to exclude sore, infected peritoneal districts?

Thirty-nine operators carried out the abdominal tamponade to stop parenchymatous, peritoneal bleeding, but only "exceptionally," etc.; two other operators used it only during the operation, and nine operators were never in a position from the indication in question to use the abdominal tamponade; twenty-two operators replied in the affirmative to the question respecting abdominal tamponade for the exclusion of sore, infected peritoneal districts; six operators answered in the negative; four operators made no statements whatever, and eighteen operators used the tamponade only "exceptionally."

In what manner do you conduct this tamponade?

Most of the colleagues use the Mikulicz tamponade; others use gauze strips of the most various origin, either alone or in combination with a drain. Occasionally also cigarette drains and the Fabricius tamponade are used.

Do you make vaginal drainage?

Thirty-seven colleagues use the vaginal drainage but only "exceptionally." Thirteen colleagues (of whom eleven were surgeons) make no vaginal drainage.

All colleagues who use the vaginal drainage do so after total extirpation of the uterus, principally after the Wertheim operation (Heer only exceptionally), and in the case of purulent pelvic diseases; sometimes in order to guarantee the stoppage of bleeding.

Nine colleagues only make the vaginal drainage after supravaginal amputation of the uterus, and eighteen colleagues, the vaginal drainage with preservation of the uterus "only in cases of special complications"; nineteen colleagues, who occasionally drain vaginally, refrain from vaginal drainage when the uterus is preserved.

When and how do you make the vaginal drainage?

Thirty operators give approximately the following indications with respect to the vaginal drainage. Suspicious pus "in abdomine," appendicitis, Wertheim carcinoma operation, septic peritonitis, intestine complications, stanchless parenchymatous bleeding (perhaps after extrauterine pregnancy), great losses of the pelvic peritoneum, suspicious ovarial tumours, vaginal total extirpation of the uterus.

Thirty-two operators make statements such as the following with regard to carrying out the vaginal drainage: "If the uterus is preserved, the Douglas is opened from below"; "occasionally hemisection of the back wall of the cervix stump plus opening of the Douglas"; "at first by gauze tamponade in order to create a less sinuous cavity"; "generally by means of a gauze bag conducted out per vaginam," etc.

Do you carry out rinsings of the peritoneal cavity with physiological salt solution? When and how?

Fifteen colleagues make no use of rinsings of the pelvic or peritoneal cavities; thirty-five colleagues use rinsings of the abdominal cavity more or less conditionally.

The indications for the rinsings are different according to the different operators, as also the manner of their execution.

In addition to the physiological salt solution, Hayem and Locke solution is also used.

Do you dab out the peritoneal cavity? When and how?

Forty-eight colleagues dab out the peritoneal cavity in some manner or other. The indication for this is given by the presence of blood, pus, ascites, tumor, and injection liquid.

The means of dabbing out (emptying) the pelvic cavity consists of dry or slightly moist dabs and compresses, occasionally in changing the position of the person operated.

The Geneva Women's Clinic has attempted with success the drying of the pelvic cavity by means of an aspiration water pump.

SUMMARY OF A NUMBER OF CONCLUSIONS (OF THE ANSWERED QUESTIONNAIRE).

The peritoneum is the most tolerant of all tissues of the body when it is quite correctly drained and the function of its neighboring organs is not paralyzed or annulled.

The peritoneum cannot absolutely support: (1) Chemical irritations caused by antiseptic solutions, even in the very weakest concentration; (2) cooling and (3) drying (von Arx).

The operation should be strictly aseptic, the peritoneum should be gently treated, and the stoppage of bleeding must be strictly carried out (Pfaehler).

But the treatment before the operation is also of great importance with regard to the treatment of peritoneal wounds; the patient should not be weakened by means of a purgative treatment (Guggisberg). (Muret is in favor of the purgative treatment.) The patients must receive abundant

liquid "post operationem," and their position must be changed often (Haeberlin).

The abdominal circulation should play an important part in the treatment of peritoneal wounds; care should therefore be taken to apply this by means of manual vibration massage (Bourcart).

The infusions of salt solution into the small pelvis also aim at removing the intestines from it at first (Kopp).

The peritoneum possesses scriptural patience: it thinks no evil; it tolerates; it pardons.

SUMMARY OF THE FACTS AND RESULTS FOLLOWING FROM THE WORK OF THE ZÜRICH, BALE AND GENEVA CLINICS, IN SO FAR AS THE TAMPONADE, DRAINAGE AND PERITONIZATION COME INTO CONSIDERATION.

In the WYDER Clinic, out of 1225 cases 84 were subjected to the tamponade drainage, i. e., 6.8 per cent (7 with affections of the uterus, 68 with affections of the adnexes and 9 with retroflexio uteri fixata). The mortality of the drained cases amounts to 29 per cent.

A more thorough study of the cases of tamponade drainage shows that there is every reason to render more rigorous the indications for the tamponade.

A report has been drawn up by the von Herff Clinic on 45 cases of drainage for purulent adnex operations; the mortality of the drained cases amounts to 24.4 per cent.

The high rate of mortality of the Bale cases leads to the conclusion that, however exact the drainage may be, it does not guarantee a favorable result.

It will be possible to bring the drainage (by means of rinsings) more and more into disuse and to reserve it only for those cases where it is necessary to stop surface parenchymatous bleeding or to close perforation openings of the intestines.

In the Geneva Clinic it was possible to make the observation that, by a greater limitation of the tamponade drainage in the years 1907 to 1912, the mortality was by no means increased in comparison with the more frequent use in the years 1903 to 1907.

The indication for the tamponade drainage must be made more and more rigorous and must have a better scientific foundation.

It is not to be denied that it plays a part that must not be underestimated as far as the immediate success is concerned.

Although an exact peritonization is also of extreme importance, it can nevertheless, in difficult cases (great peritoneal losses, etc.), be replaced to advantage by the tamponade drainage.

The Geneva Clinic uses, after the Wertheim radical operation, in addition to an exact peritonization of the pelvic cavity, an extensive tamponade drainage upward and downward.

They have the decided feeling that if the rise of peritonitis is not thereby absolutely prevented, it can at any rate be very much restricted.

RECASENS (*Madrid*): The conservation of an aseptic peritoneum in the operation wants the following essential elements: More than the rigorousness of the usual practice of asepsis, softness in the manipulations, an entire hæmostasia, the shortness of the operation and the entire restoration by the most careful suture of all bleeding surfaces which had been produced on peritoneum.

KLOTZ (*Tubingen*): In the infundibular extract of the pituitary body we possess a remedy which, when injected at the sinking blood pressure, produces a raising of it, generally of moderate height, for a prolonged time. It stimulates further on the peristaltic motion and increases the diuresis. On account of these qualities the infundibular extract is a valuable therapeutic remedy for the treatment of peritonitis.

After preliminary experiments on animals, whose blood pressure was lowered by toxical influences, one turned to the clinical treatment of the peritonitis. We have the result of 40 injections altogether. As these are fully described in another place (Kongresszeitschrift und Monatsschrift f. Geb. u. Gyn., Oktoberheft, 1912), here follows only a brief comment on two cases of peritonitis, which were treated with infundibular extract and cured in the end. This full success encourages to further experiments in the same course.

HOEHNE (*Kiel*): An effectual defense against the invasion of bacteria into the abdominal cavity consists in keeping off the absorption of microbes into the blood (prevention of septicæmia) and in retarding the increase and in destroying the microbes retained in the abdominal cavity (prevention of serious toxæmia).

Either purpose can be attained by an effectual inflammatory irritation of the peritoneum by the injection of camphorated oil or some other irritative substance into it before the operation.

The success of the ante-operative treatment of the peritoneum depends on the strength of the exudation produced by it with regard to the number and virulence of the microbes entered into the peritoneal cavity.

Supposing the peritoneal exudation be weak and the invasion of bacteria severe, it is not probable that an extensive absorption of microbes will take place, but the protection does not suffice to paralyze their growth in the abdominal cavity, the toxins produced by them being absorbed, resulting in the death of the patient from toxinæmia.

If the reaction, following the ante-operative irritation of the peritoneum, should not be found efficient, it will prove most effectual to intensify the irritative inflammation by repeating the injection of camphorated oil at the end of the operation (ante-operative and post-operative treatment).

The post-operative treatment will only be found efficient alone in cases of slight infections of the peritoneal cavity; it will fail or even prove dangerous in cases of infection by great numbers of strongly virulent microbes.

The ante-operative irritation of the peritoneum must prove ineffectual if the operation is performed before sufficient bactericide forces have been mobilized. In case the exudation produced remains unequal to the quantity and strength of the infectious material, or if the protective wall furnished by the exudation is attacked not only from the abdominal cavity but also by microbes invaded in the blood—that is, firstly, if the operation is performed too soon, secondly, if the peritoneal cavity is permanently flooded by microbes and toxins (as from an intestinal fistula), and thirdly, in cases of septicæmia originating from a source of infection outside the abdominal cavity—this will prove an unsuccessful experiment.

In the "Kieler Universitätsfrauenklinik" the ante-operative treatment by irritation of the peritoneum has been successfully applied in more than 250 cases where the peritoneum was likely to be infected. The body has never been injured by the irritative substance, either primary (camphor intoxication) or secondary (adhesions).

HANNES (*Breslau*): In the radical abdominal operation of cancer of the uterus there is considerable danger of endogenous infection by the highly virulent microbes in the primary lesion and the connective tissue, lymphatic vessels and glands of the parametrium.

We do not at present know of any improvement of our technique or of any manipulation which is sure to prevent such germs from finding their way into the peritoneal cavity during the operation.

Adequate drainage of the parametric wound surfaces and of the peritoneal cavity is necessary to prevent progressive fatal infections.

In order to protect the peritoneal cavity against infections spreading upward from the wound surfaces of the parametrium, separate drainage of this and the peritoneal cavity, the so-called "double-drainage," is required. To this end, the parametric wound surface is drained independently by a gauze wick carried into the vagina. From the parametric wound surface, the peritoneal cavity is then separated by close sutures of the serous covering. Lastly, a drain bag, according to Mikulicz, is carried from the lower extremity of abdominal wound into the depth of Douglas' cavity in order to remove the secretion of the peritoneum and to assist the formation of adhesions.

THE SURGICAL TREATMENT OF UTERINE HÆMORRHAGE DURING PREGNANCY, DELIVERY AND CHILDBED

COUVELAIRE (*Paris*): I shall limit myself to presenting in a summary manner the present state of the doctrines and practice of French accoucheurs respecting the surgical treatment of hæmorrhages by insertion of the placenta on the inferior segment, and of retroplacentary hæmorrhages.

Under the general term "surgical treatment," we include:

(a) Direct surgical hæmostasis by hysterectomy.

(b) Hæmostasis realized automatically by the uterine muscle, after evacuation of its contents by hysterotomy (hysterotomy through the abdomen and hysterotomy through the vagina).

HÆMORRHAGES ARISING FROM DETACHMENT OF THE PLACENTA INSERTED ON THE INFERIOR SEGMENT.

Most of the French accoucheurs have up to the present remained faithful to the purely obstetric methods:

Wide rupture of the membranes;

Eventually, introduction into the interior of the widely opened fœtus of an incompressible ball of Champetier de Ribes or, in default of the ball, simple turning, without immediate extraction (Braxton Hicks).

The complete statistics published at Paris, Lyons, and Toulouse in the last few years, render it possible to form an exact idea of the results obtained by the execution of this therapeutic method:

	Cases	Died
Pinard	162	10
Champetier de Ribes	67	6
Bar	153	14
Maternity Hospital of Lyon	167	13
Ferré	35	4
	584	47

Or a gross mortality of 8.2 per cent.

If the cases are eliminated in which the person was already lost before arriving at the clinique, the mortality is:

Pinard	3.2 per cent
Champetier de Ribes	4.6 per cent
Maternity Hospital of Lyon	4.9 per cent

Therefore, for women bleeding from the fact of the vicious insertion of the placenta, the mortality in the French clinics during the last 20 years has been about 4 per cent.

Infection and violence during the evacuation of the uterus are responsible for three fifths of the cases of death. The extremely small risk of death by hæmorrhage (1.2 per cent) does not justify either the prophylactic practice of Cæsarean premature delivery or the systematic practice of the evacuation of the uterus by hysterotomy during labor. The total fœtal mortality oscillates with the obstetric methods between 44 and 60 per cent. It is generally due to debility caused by prematuration. The

percentage of mortality decreases with the degree of maturity of the children.

The conclusion which appears to follow from all these facts is that the systematic practice of the Cæsarean section, in the cases of serious hæmorrhage by vicious insertion of the placenta, is unjustified. We are sufficiently armed by our obstetric methods to combat hæmorrhage with success, if we intervene as soon as the surgical indication to intervene is clearly established.

Every time that the state of the woman would permit us to count upon success in practicing the prophylactic Cæsarean section, we have the certitude of obtaining the same success by our obstetric methods, applied under the same operative conditions from the point of view of asepsis and technical competence. We thus respect entirely the function of reproduction for the future and if we too often pay for this preservation by the death of the child, our regrets are diminished by the fact that the child is in most cases weak as the result of premature birth.

We have this certitude each time that our obstetric action can be carried out without violence in a pelvic-genital opening which is normal from the point of view of permeability, dilatability and microbian flora. But if this condition remains unfulfilled in the slightest degree, this is a reason for resolutely directing the treatment into the surgical path.

1. *Complex Dystocy.* Case in which, in addition to hæmorrhage caused by vicious insertion, there is some obstacle to easy delivery by the natural way (fibromes, narrow basins, cervical cicatrice).

2. *Insufficient dilatability of the neck of the uterus.* Case in which it is necessary to proceed quickly and in which the neck is not dilatable or is dilatable only with difficulty; case in which the absence of uterine contraction and the persistence of hæmorrhage after the application of a ball or the podalic turning render necessary the immediate evacuation of the uterus.

These are quite exceptional conditions in women who have bled or are bleeding from the fact of the vicious insertion of the placenta.

3. *Infection of the genital passages.* For women suffering from scarcity of blood and infection, brought to the maternity hospitals at the commencement of or during labor, after having been subjected outside to examinations and treatments, there is something better than hurrying on delivery or wasting hours waiting for the possibility of bringing about the delivery without violence. The Porro operation might diminish the risk of mortality.

The transperitoneal Cæsarean section on the ancient system and partial or total hysterectomy are the two methods which, according to circumstances, appear best to fulfil the exceptional indications of the surgical treatment of hæmorrhages caused by insertion of the placenta on the inferior segment.

HÆMORRHAGE CAUSED BY DETACHMENT OF THE PLACENTA NORMALLY INSERTED

(*Retroplacentary hæmorrhages and uteroplacentary apoplexies.*)

The grave cases of retroplacentary hæmorrhage still give a mortality of 40 per cent.

The improvement of the results will be obtained to a certain extent by a surgical orientation of therapeutics.

The therapeutic problem is complex, for, in addition to the factors of hæmorrhage and infection, the prognosis depends on the pathological condition during the course of which the hæmorrhagic accident happened, and on the numerous organic alterations that it has produced.

In exceptional cases, the detachment of the placenta takes place absolutely without warning in a woman presenting every appearance of health. In the cases of cataclysmic hæmorrhage, a rapid surgical intervention, of certain hæmostatic effect, such as hysterectomy, is alone capable of arresting the hæmorrhage and saving the woman. These cases are exceptional. In most cases the premature detachment of the placenta is observed in women presenting the accompanying symptoms of the condition of gravidic toxæmia. This condition partially dominates the prognosis.

The state of hæmorrhagic shock is not always in proportion to the quantity of blood lost.

Retroplacentary hæmorrhage is not always anatomically characterized by a simple retroplacentary hematome. The detachment of the placenta may be the result of a real uteroplacentary apoplexy. The wall of the uterus is then the seat of a colossal sanguinary infiltration. The wide ligaments may be the siege of sanguinary infiltrations going up as high as the renal regions. These great lesions must be considered as an aggravating factor of the general condition, and as a possible factor of secondary hæmorrhages. In any case this state of the uterine wall, observed during the course of a Cæsarean operation, would necessitate hysterectomy.

The neck of the uterus fairly often presents a special ligneus consistency. The choice of therapeutic methods will depend on the condition of the neck of the uterus at the moment when the indication to evacuate the uterus presents itself. But, however little the neck of the uterus lacks suppleness and dilatability, the obstetrical dilatation must be given up and recourse must be had immediately to surgical processes of rapid evacuation of the uterus. The abdominal way, which alone permits the existence of lesions of uteroplacentary and para-uterine apoplexy to be observed, appears to be preferable to the vaginal way. In exceptional cases, after the evacuation of the uterus, an incoercible hæmorrhage would render necessary hæmostasis by hysterectomy.

SUMMARY

In order to summarize in a few words the present state of the doctrines and practice of French

accoucheurs with regard to the surgical treatment of hæmorrhage caused by vicious insertion of the placenta, and of retroplacentary hæmorrhage, the following remarks may be made:

In general, French accoucheurs have preserved, with regard to obstetrical hæmorrhages, the pre-eminence given to the non-surgical methods of hæmostasis. They have endeavored to define the real indications of the surgical methods, which must be reserved for the relatively rare cases in which obstetrical methods are powerless or dangerous.

The surgical solutions are certainly often more rapidly and easily realized. But the price paid for their success, which moreover cannot be constant, is the definitive mutilation or the decrease of the obstetrical value of the woman operated.

Except for the rare cases in which surgical action must be preferred, it must be recognized that the improvement of the therapeutic results will be the consequence not of an unjustified extension of the indications of surgical methods, but of the perfecting of the obstetrical education of physicians and accoucheurs.

PREGNANCY

PH. JUNG (*Göttingen*): The best way of treating abortion is to dilate the cervix and empty the uterus by finger. In special cases hysterotomia anterior is indicated.

Myomata causing hæmorrhages during pregnancy are always situated in the cervix and must be removed. In case of abortion, hysterectomy is the best treatment on account of the danger of infection.

The treatment of carcinoma uteri is radical operation without delay. In case of inoperability, colpohysterotomia or Cæsarean section at the full term; in the meantime the usual palliative treatment.

Perforating lesions of the uterine wall during pregnancy are treated by suture, in severe cases by hysterectomy.

LABOR

In case of premature detachment of a normally situated placenta, rapid delivery has to take place. If the cervix is not yet sufficiently dilated for forceps or version, colpohysterotomia anterior is indicated. Contracted pelvis requires Cæsarean section.

The best treatment for partial placenta prævia, superior to the version, is the metreurysis. In cases of central placenta prævia, colpohysterotomia anterior is indicated provided the measures of the pelvis are normal, otherwise Cæsarean section.

Lacerations of the cervix causing hæmorrhages ought to be sutured carefully. All other methods of treatment are to be considered only as makeshift.

When rupture of the uterus occurs, operation is strictly indicated. The best way is to perform laparotomy and either suture the wound or remove the uterus. Only incomplete ruptures might be sutured with good result by the vaginal way. Tamponing ought to be resorted to as seldom as possible.

In cases of uterine inertia, exciting of uterine contractions, and, if not sufficient, tamponing the uterine cavity, will generally check the bleeding. When these methods fail hysterectomy by vaginal or abdominal way is indicated.

In cases of inversion the object sought is the reposition of the fundus uteri. In case of failure hysterectomy offers the best result.

PUERPERIUM

In cases of hæmorrhages caused by retained portions of secundines first administer ergot, if this fails, remove them by finger. Fever does not obviate that. Subinvolution without retention requires only the administration of ergot.

Myomata causing hæmorrhages during the puerperal state have to be removed either by vaginal or abdominal operation, according to their size.

Carcinomata must be treated by radical abdominal hysterectomy. In case of inoperability the palliative treatment (excochleation and cauterization) takes place.

Hæmorrhages in the later stage of puerperium, but still within the first months post-partum, justify the suspicion of chorion-epithelioma. A sure diagnosis can be made only by microscopical examination of fragments removed by curetting. The chorion-epithelium requires immediate abdominal hysterectomy.

COMPRESSION OF THE AORTA

In cases of acute hæmorrhages caused by lacerations of the uterus, placenta prævia, uterine inertia, when the usual methods fail, temporary compression of the aorta may save some lives.

Compression by finger is generally not sufficient.

Momburg's constriction is at present the best method of compressing the aorta—far superior to the other complicated apparatuses.

E. P. DAVIS (*Philadelphia*) opened the general discussion of this theme with a brief but concise and convincing paper, in which he advocated abdominal section and control of hæmorrhage by manual compression of the abdominal aorta (see p. 662).

A. MAYER (*Tübingen*): The compression of the aorta with the Momburg bag is serious to a diseased cardiac and vascular system.

It highly strains even the healthy heart and vascular system, and it may become dangerous to it.

If by an incorrect application of the bag the venous reflux should be entirely barred — the arterial afflux being, however, only partially interrupted — a sort of deadly hæmorrhage into the veins may take place.

In case of considerable nephroptosis the disconnection of the kidney from the circulation, caused by compression of the arteria renalis, is to be feared, which may injure the kidney as to its anatomy and to its functions.

HIRSCH (*Berlin*): The injection of ergotinum into the muscle of uterus is a sure, safe and quickly operating method producing vigorous contractions

and removing atonia. It is superior to all the other methods of application.

O. KÜSTNER (*Breslau*): The extraperitoneal sectio Cæsarea allows a more extended practice than the transperitoneal, cervical and the classical sectio Cæsarea.

It may also be applied in cases which in general are esteemed to be infected cases.

It is in general possible to avoid, with application of the extraperitoneal section, the perforation of the living child.

BAUMM (*Breslau*): The operation in question, extraperitoneal section, cannot always be executed purely extraperitoneally; even in the case of the best modification existing at present, viz., Latzko, the peritoneum is ruptured in about one third of the cases.

Therefore the operation must not be called extraperitoneal Cæsarean section. Also the expression cervical Cæsarean section does not meet the requirements, for it is also vaginal. Sectio suprapubica or suprasymphysary section are suitable denominations.

The extraperitoneal suprasymphysary section is on an average three times as safe for preserving life as the transperitoneal.

All cases are suitable for the operation which do not show high fever or decomposed contents of the uterus. The mortality of the mother, whether the operation is extraperitoneal or transperitoneal, is 2 per cent.

Cases with high fever or with evil-smelling amniotic liquor show a result of about 8 per cent mortality when the peritoneum is opened. If the peritoneum remains uninjured, the mortality of the mother is also in this case not higher than otherwise (cf. Thesis 4). So long, therefore, as there are no means of executing the operation with certainty extraperitoneally, such cases should not be attempted in this manner, unless in special cases the possibly high risk of mortality of the mother appears justified.

The sectio suprapubica is an immense enrichment of obstetric therapy in so far as it renders it possible in most cases of impassable genital organs for the child to be born alive, without subjecting the mother to a special danger of life, even in so-called unclean cases. It is superior in this respect to the classic Cæsarean section, to the operations for widening the pelvis and to artificial abortion, which only enters into competition with it in the case of moderate narrowness of the pelvis.

A raised position of the pelvis is not necessary. It facilitates the access to the cervix, but is in the way for the development of the child.

With regard to the drainage of the pelvic cellular tissue cavity the following is advisable:

(a) Clean cases with dry surgical conditions are not drained.

(b) Clean cases with heavier wound secretion are drained by means of glass drains for a short time through the coats of the abdomen.

(c) Cases that are certainly unclean are drained to the vagina with iodoform gauze and upward with glass drains.

(d) Doubtfully clean cases are only drained to the vagina.

It is advisable, but not necessary, to wait until the collum has unfolded. Even in cases where the collum has not unfolded the operation succeeds quite as often extraperitoneally, i. e., in about one third of the cases.

For later births the operation does not necessitate any disadvantage.

There is no objection to the repetition of the operation in the same woman. It succeeds quite as well the second time and quite as often extraperitoneally as the first time, the principal contingent being supplied by the cases which succeeded extraperitoneally the first time. The operation can also certainly be performed a third time with the same success, if it is not preferred this time to sterilize the woman, and for this purpose to carry out the classic section.

An unpleasant contingent circumstance is the thrombosis of the crural veins, which often occurs, viz., in 9 per cent of the cases. It is, however, of transitory significance and not calculated to diminish the value of the operation.

MISCELLANEOUS PAPERS

THE ANATOMICAL BASIS OF PLACENTA PRAEVIA TREATMENT

PANKOW (*Düsseldorf*): In the physiological adhesion of the ovum in the womb, the mucanous membrane alone forms the soil for the development of the placenta, and a penetration of the womb musculature with villus formation does not, under normal conditions, take place. Also there is no destruction of the paries musculature by fœtal cells, so that the muscular system remains fully in working order, and generally guarantees the most favorable conditions for stopping the blood after birth. A hæmorrhage from the canal and the cervix uteri cannot occur, because in the normal position of the placenta the elasticity of the canal and the cervix, if only relative to the corpus, is sufficient to prevent hæmorrhage from this system so long as there are no ruptures.

The conditions with placenta prævia are quite different. Two kinds of placenta prævia must be distinguished—a primary, in which the result is the embedding of the ovum, and a secondary, in which the ovum is embedded more or less deeply in the corpus uteri, and when a more or less large flap

of the placenta has grown into the isthmus uteri. The former kind is the more unfavorable for prognostications, because generally the greatest part of the placenta then lies in the imperfectly elastic canal system and because the modifications of the paries which cause the fatal hæmorrhage are much more strongly pronounced. The modifications which necessitate a bad prognosis of placenta prævia in both kinds of implantation are as follows: In the first place there ensues, because the placenta itself adhered to the canal, a more or less large dilatation of the vessels at this point, which does not take place with the placenta in normal position. Now the elasticity after birth is no longer sufficient to get the vessels to close up. Furthermore, not only are the vessels in the whole procreatory system dilated, but the elasticity of their paries is often seriously diminished by the growth of the fœtal cells into it. At the same time generally the musculature is also thereby very much relaxed and often also invaded by fœtal cells, and even the intrusion of villus.

For this reason the therapeutic suggestions are to be rejected which do not have regard to the easiness of rupture and the imperfect elasticity of the canal and the cervix with placenta prævia. The overstretching can only be avoided by the Cæsarean operation, and that most safely in the abdomen. This treatment is all the more advisable because the mortality of mothers in cases of placenta prævia in the public institutions still amounts, on the average, to 5-10 per cent, that of the children to 50-80 per cent. The objection continually raised that, "when we consider the severity of the pain of placenta prævia the life of the child is of no account," is to be wholly rejected. That is in opposition to the conception everywhere held of the value of the child's life when the pelvis is small. As in that case, so with placenta prævia, we must practice that treatment in the first place which, while putting the mother in the least possible danger, is able to save the life of the largest possible number of children. That is the Cæsarean operation. The objection that only a fraction of the cases of placenta prævia can be submitted to the Cæsarean operation at all, because they are mostly tamponed before coming to the surgery, is not correct. If doctors, students, and midwives are accustomed to regarding any hæmorrhage in the last months of pregnancy as sure signs of placenta prævia, and to sending such women immediately to a surgery on account of the renewed hæmorrhage to be expected at birth, in about 50 per cent of the cases the woman will be clean, and so suitable for the treatment by Cæsarean operation. In the Freiburg Women's Surgery previously we have been able to deliver 38 out of 79 cases of placenta prævia by the Cæsarean operation. The total mortality of children capable of life over 2000 g. amounted to 2.9 per cent, the total mortality of mothers 2.5 per cent. These results are so extraordinarily favorable in comparison with the former ones, that the method of the Cæsarean operation in the abdomen should be more practiced in the surgeries in the treatment of placenta prævia than formerly.

THE PRINCIPLES INVOLVED IN THE OPERATION FOR EXTREME CASES OF PROCIDENTIA; AN OPERATION FOR PERMANENT RELIEF.

J. RIDDLE GOFFE (*New York*): In dealing with cases of prolapsus uteri with attendant rectocele and cystocele, the great factor to be reckoned with is intra-abdominal pressure. Pelvic pressure is simply intra-abdominal pressure continued into the pelvis.

All applied force tends to move in straight lines. It can be diverted from a straight line by centrifugal attraction or it can be deflected by an opposing plane placed at any or at varying angles to its direction.

With the large opening that characterizes the female pelvis at the superior strait, giving ready access to intra-abdominal pressure, and the double opening in the pelvic floor, no tissues could withstand the direct and constant impact of this force. Nature has therefore a system of deflecting planes to receive, direct and divert it. The deflecting plane which meets intra-abdominal pressure as it comes down into the pelvis is the posterior surface of the uterus and broad ligaments. This plane of tissue is supported by muscular ligaments. These ligaments elongate with the first impact of intra-abdominal pressure, but, in reacting, contract, tilting the uterus so that the pressure is deflected back into the axis of the outlet when it is physiologically applied, without disastrous results to the viscera or pelvic floor. The bladder ligaments and the uterine ligaments, in the meantime, with the assistance of the muscles of the pelvic floor, restore visceral poise and equilibrium.

It is thus seen, as Sturmdorf says, that an intrapelvic and an extrapelvic deflecting mechanism exercising harmonious and reciprocally balancing influences, maintains the topographic stability of the pelvic contents. The intrapelvic mechanism is represented by the uterus with its ligamentous extensions, the extrapelvic deflector by the muscular and fascial elements of the pelvic floor. "These muscular and ligamentous elements serve to support the pelvic contents, not by virtue of their textural resistance but by deflecting the displacing force of intra-abdominal pressure." The operation I present is based upon the principle that, to secure most perfect and lasting results, these muscular and ligamentous supports must be anatomically and functionally restored.

It is understood that in all the steps of the operation the fascia and connective tissue are carefully sought and stitched to give support.

The bladder itself and the anterior vaginal wall demand special attention. There is presented here a hernia of the bladder and a slipping down — "a glacial-like action" — of the various planes of tissue composing the vaginal wall. The bladder debouches through the hernial opening, thus dragging down its remaining. This destroys the integrity

of the trigonum and thereby interferes with the functions of the ureters. The trigonum is a fixed portion of the bladder and does not participate in its expansions and contractions. The object of this fixation is to maintain a comparatively firm and stable position of the ureters through the bladder wall to their orifices. My operation takes cognizance of this and restores the position and fixation of the trigonum by spreading out the base of the bladder upon the uterus or broad ligaments and stitching it then at as high a level as may be indicated in each individual case.

In cases of extreme rectocele the anterior wall of the rectum is entirely denuded from the peritoneal attachment to the anus. The rectal wall is then plicated longitudinally by inserting one, sometimes two, lines of buried sutures. The levator ani muscles are then isolated and stitched together by buried sutures to restore the function of the pelvic floor.

All cases are divided into two classes, viz: (1) Patients in the childbearing period, (2) patients at or beyond the menopause. In the first class the uterus is retained and its normal position restored by shortening its ligaments. The bladder is dissected free and spread out upon the face of the uterus and broad ligaments by three stitches in its wall. In the second class the uterus is removed, and the plane of tissue designed to deflect intra-abdominal pressures is reconstructed by stitching together the stumps of the broad ligaments across the pelvis, care being exercised to secure the stitches, and thereby restore the functions of the infundibulopelvic ligaments, the round ligaments, the uterosacral and the cardinal. This plane of tissue is supported and tilted by these ligaments to the same degree that the uterus is under normal conditions, the intra-abdominal pressure being thereby deflected into the axis of the outlet.

The operation is done entirely through the vagina.

HEINRICH LOPEZ (*Valencia*) followed with a paper on the same subject as follows:

The lack of cardinal principles observed in the etiology and pathology of cases of prolapsus of the feminine organs of generation explains the embarrassment encountered by the modern gynecological physician in choosing a method of operation leading to a radical cure.

The ligamental apparatus of suspension, which is always thin and loose in these cases, is incapable of supporting the weight of the pelvic organs of generation and of resisting the pressure of the abdomen. The plastic renewals of the apparatus of contention, even with the modern improvements which permit important reinforcements, are not to be considered strong enough to prevent the descent of the deep-lying organs of generation. The resections of the wall of the vagina, as well as the cloisonnement, would lead, as I have already observed several times, finally to a relapse by stopping cicatrization or by causing the cicatrice to break.

The extirpation of the uterus is not the most rational operative proceeding, for the walls of the vagina, which are then deprived of all action of resistance, are soon driven outside. The intraligamental colpopexy is a purely theoretic complement to the operation, which should be condemned in practice because it does not fulfil the functions of fixing the culs-de-sac of the vagina and of the peritoneum.

The really practical progressive evolution of the operations in which we are justified in expecting a radical cure should be sought, in my opinion, on the lines laid down by Fritsch, Wertheim, Schauta, and Landau.

Dr. Landau's procedure is the one that deserves the preference, for he has the advantage of his predecessors by bringing about the extirpation of the uterus, that is always useless and almost always diseased.

Dr. Landau's method may be characterized fundamentally as: (1) An operation essentially anatomic (and this is its defect) but easy and benign; (2) an incomplete hysterectomy as it respects only the piece of isthmus for the insertion of the sacrouterine ligaments; (3) the anterior and posterior or Douglas culs-de-sac of the peritoneum are obliged to disappear by the hyperanteflexion and the methodic suture; (4) the muscular piece of the uterus that is preserved will serve as a centre of resistance in the extraperitoneal cicatrice block by fulfilling the function of the uterus, which is preserved by Schauta and Wertheim almost always in a heavy and diseased condition; (5) the operative complement of perineoplasty assures the resistance of the sustentation, but the value of Landau's method cannot be denied, as it is an operative complement of all operations for prolapsus.

Since the academic period of 1906 to 1907, I have practiced the operation of Landau in the Gynecologic Clinic of the Faculty of Medicine of Valencia (Spain). Out of a total of 68 cases I have only had one decease which arose from cardiac complication.

Since this period, only two patients have come to consult me with relapse of the anterior colpocela, but without showing vesical clinical syndrome.

THE WASHINGTON SURGICAL SOCIETY

THE REGULAR MEETING OF THE SURGICAL SOCIETY WAS HELD MARCH 15, 1912, THE PRESIDENT, DR. CARR, PRESIDING

Present: Drs. Wellington, Shands, Abbe, Stone, Snyder, Fowler, Miller, Hagner, Hooe, Riggles, Lehr, Fuller, Bovèe and Erving.

The minutes of the last meeting were read and approved.

CASE REPORTS

Dr. I. S. STONE presented a specimen and case report of deciduoma malignum with microscopic section.

"Gyn. Dep. Columbia Hospital. No. 276. Mrs. B., colored; age 24; married; 5 para; no miscarriages. Last labor, August, 1911. Has had profuse menstruation since then, becoming profuse in December, 1911. She was admitted into Columbia Hospital, January 20, 1912. She came in to be treated for the profuse flow, and had no other symptom. Her general condition was quite satisfactory, and there were no constitutional symptoms whatever. Examination showed the presence of an enlarged uterus with normal adnexa. Our diagnosis was 'fibrosis' of the uterus. Supravaginal hysterectomy on February 3d.

"The uterus was perhaps 2½ times its normal size and mucosa on section revealed the presence of a soft mass on the mucosa near the fundus, very much like adherent secundines or decidua. Although we had some misgivings that the condition was one of malignancy we awaited the report of the pathologist before removing the cervix, which was done on February 16. Macroscopic examination was indicative of malignancy, and microscopic examination by Major Russel and his associates confirms this opinion, and announces the diagnosis of 'deciduoma malignum.' "

In discussion, Dr. MILLER said he had never seen a case of deciduoma malignum, though the specimen presented did not quite agree with descriptions usually given. The diagnosis is usually made for some metastasis in the vagina or lung. The growth always follows pregnancy, normal or abnormal, and is rapidly fatal.

Dr. HOOE said these cases seemed to be of two types — sarcomatous and carcinomatous. Early diagnosis offers the only hope of cure; Hirst says persistent bleeding following labor should be investigated; early cases give 40 per cent of cures.

Dr. GEORGE TULLY VAUGHAN reported a case of probable malignant adenoma of both ovaries— one very large.

"The patient, a white female aged 30, was referred to me by Dr. Barton and was operated on at Georgetown University Hospital, March 11, 1912.

"Family history unimportant. Patient had usually had good health except that menstruation had always been irregular in coming too often — sometimes twice a month and later three times a month. For about a year she has been conscious of a feeling of weight in the abdomen and has had backache, headache, constipation and has vomited a few times. Six weeks ago she became conscious of enlargement of the abdomen and this has rapidly increased so that the patient's abdomen is nearly as large as that of a woman at full term. She is quite emaciated and feverish, temperature ranging from 100 to 103 and pulse from 90 to 100; hæmoglobin 40 per cent and leucocytes 20,000. Vaginal examination reveals a hard mass like a fœtal head in front of the uterus and slightly, if at all, movable. The os uteri is far back and high up, scarcely to be touched. Externally the tumor can be felt as a smooth but somewhat irregular mass, slightly movable and extending a hand's breadth above the navel.

"Diagnosis: Solid tumor with degeneration or infection — probably malignant origin uterus or ovary.

"Under morphine-atropine-ether anæsthesia the abdomen was opened below the navel in the median line, evacuating a quantity of bloody serum and revealing a large tumor which filled the pelvis and projected well up into the abdomen. The tumor was greyish in color and was adherent to everything by slight and recent adhesions which were easily broken, but the breaking was followed by considerable bleeding. It was easily delivered after extending the incision above the navel and was found to have a small pedicle only that of the right ovary from which it evidently developed. This was ligated with catgut, including the tube, and the tumor was removed. A similar tumor in appearance, about as large as a hen's egg, occupied the position of the left ovary and was also removed.

"The large growth had the shape of a kidney and measured 8 inches in length and 15½ inches in circumference. On section it was greyish or yellow in color and contained two or three cystic cavities in which was fluid. The uterus and tubes seemed normal. Hard nodules, yellowish

in color, were felt and seen in the great omentum and in the stomach walls about the greater curvature — few in number and small, about the size of a pea. The question arises first, was this tumor primary or secondary? This is not an easy matter to decide. The nodules in the omentum and stomach would seem to indicate a primary disease elsewhere — perhaps in the ovary, although the rule is to have the secondary growth in the ovaries. Sutton quotes Schlagenhaufer's collection of malignant tumors of the ovary, 79 in number, of which 61 were from primary growths in the stomach, 10 in the bowel and 7 in the biliary apparatus. Sutton says primary cancer of the ovary is a rare disease.

"Sarcoma is not very common, according to the authorities, and Sutton says that sarcoma of the kidneys, ovaries and adrenals in adults is invariably unilateral, whereas adenoma of the ovary is apt to be bilateral."

Dr. BOVÉE, in discussing Dr. Vaughan's case, said that the most common solid tumor of the ovary is fibroid usually occurring in both ovaries. This tumor is more likely to become sarcoma than carcinoma. He would like to know if the pedicle was twisted, as that would account for some of the adhesions and the color of the tumor. We have primary sarcoma and carcinoma in the ovary, and it is now well known that many ovarian cysts in women over 40 are malignant.

DR. VAUGHAN said he had excluded hypernephroma in this case, as the appearance is different and hypernephroma would not likely occur in both ovaries. The apparent metastasis favors malignancy. There was no twisting of the pedicle. He hopes to have a positive diagnosis soon from the laboratory.

DR. FOWLER reported a case of a woman, age 40, seen in Freedmen's Hospital. There was marked pain in right side; two years before there had been hæmorrhage from the bladder, followed by pain of a colicky nature. There was rather marked pyuria. The bladder was normal, with nothing coming from the right ureter. Urine from other side was normal and tests with indigo-carmine and phlorydzin were negative. The X-ray showed nothing. The ureteral catheter met obstruction at a height of 14 cm. A stricture of the ureter was thought to be present with resultant pain due to distention. The kidney upon removal showed cystic degeneration, with distended pelvis and ureter. The kidney showed practically only a capsule, due no doubt to a pressure degeneration of two years' standing. The course of the stricture could not be determined; a catheter could not be passed down. Carbolic acid was injected into part of ureter left and ureter ligated.

DR. BOVÉE said the point that impressed him in the history was the occurrence of pain, which he does not think due to distention. A ureter can be ligated several weeks without serious impairment of kidney structure or function. He thinks it would have been better to have removed the dilated portion of the ureter.

DR. I. S. STONE read a paper on "Hypernephroma of the Kidney." Report of three cases. (See p. 665.)

DR. ABBE showed a series of skiagraphs of the last case which had presented some abdominal symptoms. The pictures had been taken in series after a bismuth meal; nothing distinctive was found; the region of the kidney was negative.

DR. BOVÉE said it was interesting to have a man report three cases of this rather rare tumor. He wished Dr. Stone had referred to the splendid work of Dr. A. O. J. Kelly in the pathology of this tumor. It is now thought that most renal tumors are of this type. He had removed one specimen weighing 14 pounds. He had had five cases, some of whom are still alive. If the growth is removed early the prognosis is very fair.

DR. FOWLER thought it interesting that two members should have had eight cases. He exhibited a photograph closely resembling Dr. Stone's specimen; in his own case the chief symptom had been hæmaturia which had lasted one night and then disappeared for two years, followed by another 24-hour recurrence. The tumor could be made out by inspection. A few red cells could be centrifugalized — a most valuable symptom. The patient died 6 months after operation with symptoms of pulmonary metastasis. Metastasis may arise from a growth so small as to escape notice at operation, which may be performed on a metastasis rather than the primary growth. The amount of metastasis has no relation to the size of original tumor.

DR. VAUGHAN said the metastasis often appeared in bone and we should consider hypernephroma in dealing with bone tumors. He mentioned a case of a woman of 33, without marked symptoms; there were no symptoms except large abdominal tumor, more marked on left side. Hypernephroma was suspected and the tumor removed; the growth was from the adrenal and the kidney much displaced. The kidney was replaced and the patient was well a few months ago. These tumors resemble sarcomas.

DR. MILLER mentioned an interesting case presenting a large tumor of the right side, giving nine dyspnœa and pressure symptoms.

Clinical Congress of Surgeons of North America

THIRD ANNUAL SESSION
NEW YORK CITY
NOVEMBER 11 TO 16, 1912

CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

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THE CLINICAL CONGRESS IN NEW YORK CITY

THAT the third session of the Clinical Congress of Surgeons of North America to be held in New York City, November 11 to 16, will be a great success in point of scientific interest and the number in attendance is definitely assured.

The completed program which appears on the following pages is comprehensive in its scope and extremely attractive from a scientific standpoint. Naturally, the most attractive feature to surgeons is the enormous clinical schedule. The program as printed, however, must be considered as merely an outline of what the clinicians of New York and Brooklyn expect to do. The daily program, as bulletined at headquarters, will be more extensive and give in detail the nature of the operative work and demonstrations. In addition to the operative clinics an excellent program of demonstrations in radiology, surgical pathology, experimental surgery and kindred subjects has been prepared to make a complete showing of New York's facilities as a surgical center.

In the list of clinicians will be found the names of the leading surgeons of New York City and Brooklyn, and in the list of institutions that have opened their doors to the Congress are the leading hospitals and medical schools of the two great cities. Every branch of surgery is covered. One specializing in general surgery, gynecology, obstetrics, genito-urinary surgery, orthopedics, surgery of the eye, ear, nose or throat, will find enough actual surgical work along any one of these lines to keep him busy from morning to night each day of the session.

For the evenings there will be six literary sessions at which papers dealing with subjects of live surgical interest will be read by prominent surgeons of America and Europe, and these will be discussed by New York surgeons. With the exception of Thursday evening, all of these meetings will be held in the grand ball-room of the Waldorf-Astoria. On that evening the gynecological and obstetrical program will be transferred to Brooklyn and the meeting held in the Academy of Music, while the section on the eye, ear, nose and throat will meet in the Astor Gallery of the Waldorf-Astoria.

ONE WEEK OF CLINICS

This, the third session of the Clinical Congress, will be limited to one week, the clinics beginning on Monday morning and continuing to Saturday

afternoon. In order that the entire week may be utilized by the visiting surgeons the headquarters, at which all clinics and demonstrations will be bulletined one day in advance, will be open on the afternoon and evening of Saturday, November 9, and the afternoon and evening of Sunday, November 10. This will enable those who arrive in New York City before Monday to register and make up their schedules for the day's work and be ready for the early clinics on Monday morning.

To facilitate the work of registration, members are urged to plan to arrive in New York City not later than Sunday and to register upon arrival.

HEADQUARTERS

The Waldorf Apartments and the grand Ballroom of the Waldorf-Astoria, at 34th Street and Fifth Avenue, have been engaged for the headquarters of the Congress. These rooms are on the main second floor of the hotel, and here will be maintained a large staff of clerks to care for registrations and the issuing of membership cards.

DAILY BULLETINS AND PROGRAMS

During the afternoon of each day of the session there will be bulletined at headquarters a complete and accurate program of the clinics and demonstrations to be held the succeeding day. These bulletins will be displayed on large boards in the grand ball-room. Also a printed program will be issued daily, announcing all clinics, demonstrations, scientific evening programs, business meetings.

MEMBERSHIP IN THE CONGRESS

Any physician or surgeon in North America in good standing may become a member of the Congress by registering at any annual meeting and paying the registration fee of $5.00. Automatically the subscribers to SURGERY, GYNECOLOGY AND OBSTETRICS, the official journal of the Clinical Congress, are members of the Congress and will receive invitations without request. To other members of the profession who desire to attend the Congress, formal invitations will be sent if they will address a communication to the Secretary of the Congress.

REGISTRATION FEE

A registration fee of $5.00 is required of each surgeon at the time of registration, whereupon a membership card will be issued.

Unlike conditions prevailing in most medical societies, where annual dues are required, payable by each member without regard to his attendance at any meeting of the society, the payment of a registration fee is required of a member of the Congress only when he is in attendance at an annual session.

The purpose of this fee is to provide funds to meet the expense of preparing for and conducting the annual meeting in order that the Congress may not impose a financial burden upon the members of the profession in the city entertaining the Congress. Judging from past experience the amount received from such fees will be barely sufficient for the purpose, so that payment of the fee is expected of all who register.

MEMBERSHIP CARDS

It will be absolutely necessary for each surgeon who desires to attend the clinics or evening literary sessions to register at headquarters and secure a membership card. This card must be presented to secure admission to the clinics and evening sessions. As stated above the registration room will be open on the afternoon and evening of Saturday and Sunday, November 9 and 10, and each day and evening during the session so that there will be no excuse for not registering.

HOTELS

In view of the fact that a large attendance is expected and as the hotels of New York City are usually well filled during the month of November all members of the Congress who expect to attend this meeting are urged to make their reservations in advance. There are a number of first-class hotels within a distance of three or four blocks from the Waldorf-Astoria where the visiting surgeons can be comfortably cared for. Some of these hotels are: the Vanderbilt, at 34th Street and Park Avenue; the Park Avenue Hotel, Park Avenue between 32d and 33d Streets; the Breslin at Broadway and 29th Street; the Woodstock, on 43d Street between Broadway and Sixth Avenue.

No reduced rates have been granted by the railroads for this meeting. An arrangement for the sale of tickets at reduced fares offered by the railway associations was not deemed a satisfactory one by the Executive Committee and was not accepted, as such arrangement would apply in only a very limited territory and the reduction in rate was not material.

PRELIMINARY PROGRAM FOR EVENING MEETINGS

Monday, November 11th—Presidential Meeting

ALBERT J. OCHSNER, Chicago: Address of the retiring President.

EDWARD MARTIN, Philadelphia (President's address): Treatment of Hepatic Cirrhosis.

ALONZO E. TAYLOR, Philadelphia: Surgical Bearings of the Bio-Chemistry of the Liver.
Discussion by ARTHUR DEAN BEVAN, Chicago.

WILLIAM J. MAYO, Rochester, Minnesota: Surgery of the Spleen.
Discussion by CHARLES H. PECK, New York City.

Tuesday, November 12th

GEORGE W. CRILE, Cleveland: Anesthesia and Anoci-Association (Lantern Demonstration).
Discussion by GEORGE D. STEWART, New York City.

OTFRID FOERSTER, Breslau, Germany: Indications and Results of Excision of the Posterior Spinal Nerve Roots in Man.

CHARLES H. FRAZIER, Philadelphia: Problems and Procedures in the Surgery of the Spinal Canal.

D'ORSAY HECHT, Chicago: Surgery of the Spinal Cord from the Neurological Standpoint.
Discussion by ALFRED S. TAYLOR and CHARLES A. ELSBERG, New York City.

Wednesday, November 13th

RICHARD R. SMITH, Grand Rapids, Michigan: A Description of the Enteroptotic Woman.

W. ARBUTHNOT LANE, London, England: Chronic Intestinal Stasis.

JOHN G. CLARK, Philadelphia: Summary of Results in Gastro-intestinal Stasis.

ROBERT C. COFFEY, Portland, Oregon: Replacing and Retaining Operations in the Treatment of Gastric and Intestinal Stasis.

JOEL E. GOLDTHWAIT, Boston: Orthopedic Principles in the Treatment of Enteroptosis and Chronic Intestinal Stasis.

Thursday, November 14th

W. W. CHIPMAN, Montreal: Problems of Obstetrical Practice.
Discussion by H. McM. PAINTER, New York City.

THOMAS S. CULLEN, Baltimore: Radical Operation for Cancer of the Cervix.

WILHELM WEIBEL, Vienna, Austria (First Assistant to PROF. WERTHEIM): The Wertheim Operation.

X. O. WERDER, Pittsburgh: The Cautery in the Radical Treatment of Cancer of the Cervix.
Discussion by ROBERT L. DICKINSON, Brooklyn.

GEORGE GELLHORN, St. Louis: Extended Radical Operation through the Vagina for Uterine Cancer.
Discussion by HOWARD C. TAYLOR, New York City.

Surgery of the Eye, Ear, Nose and Throat.

CHEVALIER JACKSON, Pittsburgh: Bronchoscopy, Œsophagoscopy and Gastroscopy (Lantern Demonstration).
Discussion by C. G. COAKLEY, New York City.

MYLES STANDISH, Boston: Extirpation of the Lachrymal Sac.
Discussion by JOHN E. WEEKS, New York City.

EWING W. DAY, Pittsburgh: Otitic Meningitis, the Indications of and the Operative Treatment for.
Discussion by FRED WHITING, New York City.

Friday, November 15th

E. G. ABBOTT, Portland, Maine: The Treatment of Lateral Curvature of the Spine.
Discussion by JOHN RIDLON, Chicago, and ROYAL WHITMAN, New York City.

JOHN B. MURPHY, Chicago: On Surgery of the Bones and Joints.
Discussion by GEORGE E. BREWER, New York City.

E. S. JUDD, Rochester, Minnesota: Prostatectomy.
Discussion by J. BENTLEY SQUIER, New York City.

SURGICAL CLINICS

Monday, November 11th

L. V. HOTCHKISS — Bellevue Hospital — 9. Operations for hæmorrhoids and fistulæ.
JOHN A. HARTWELL — Bellevue Hospital — 9.
A. E. ISAACS — Beth Israel Hospital — morning.
H. M. SILVER — Beth Israel Hospital — 2 to 4.
W. C. WOOD — Brooklyn Hospital — 10 to 12.
J. E. JENNINGS — Brooklyn Hospital — 2 to 4.
EDWARD W. PEET and CHARLES M. FORD — Children's Hospital — 9 to 12.
A. H. BOGART — Coney Island Hospital — 2 to 4.
J. J. HIGGINS — Fordham Hospital — 10.
WILLIAM P. HEALY — Fordham Hospital — 2.
O. G. T. KILIANI and HERMANN FISCHER — German Hospital — 9.
FRANZ TOREK and G. H. SEMKEN — German Hospital — 2.
R. S. FOWLER — German Hospital (Brooklyn) — 10 to 1.
W. H. LUCKETT — Harlem Hospital — 1:30.
F. W. MURRAY and staff—Hudson Street Hospital—2:30.
W. LINDER — Jewish Hospital (Brooklyn) — 9 to 12.
W. L. DUFFIELD — Jewish Hospital (Brooklyn) — 2 to 4.
PARKER SYMS — Lebanon Hospital — 10 and 2.
J. C. RUSHMORE — Long Island Hospital — 9 to 12.
A. H. BOGART and J. B. BOGART — Methodist Episcopal Hospital — 9 to 11.
W. A. SHERWOOD — Methodist Episcopal Hospital — 11 to 1.
G. S. HARRINGTON — Metropolitan Hospital — 2.
B. D. HARRINGTON — Midwood Hospital — 9 to 12.
A. B. JOHNSON and W. A. DOWNES — New York Hospital — 2:30.
SIDNEY F. WILCOX — N. Y. Medical College and Hospital for Women — 3.
H. B. DELATOUR — Norwegian Hospital — 9 to 11.
L. S. PILCHER and P. M. PILCHER — Pilcher Private Hospital — 9 to 12.
JOHN A. WYETH — Polyclinic Hospital — 11.
JEROME M. LYNCH — Polyclinic Hospital — 1:30. Operations upon the rectum and anus.
WILLY MEYER — Post Graduate Hospital — 10.
SAMUEL LLOYD — Post Graduate Hospital — 2.
S. G. GANT — Post Graduate Hospital — 3:30. Operations on colon and rectum.
JOSEPH A. BLAKE — Presbyterian Hospital — 9 to 12.
ELLSWORTH ELIOT, JR. — Presbyterian Hospital — 2 to 5.
O. S. RITCH — Prospect Heights Hospital — 3 to 5.
KARL CONNELL — Roosevelt Hospital — 9.
GEORGE E. BREWER — Roosevelt Hospital — 2.
WILLIAM S. BAINBRIDGE and staff — Skin and Cancer Hospital — 9 to 1.
JOHN ROGERS — St. Francis' Hospital — 2:30 to 5.
J. D. SULLIVAN — St. Mary's Hospital (Brooklyn) — 10 to 1.
JOSEPH B. BISSELL — St. Vincent's Hospital — 2.
W. L. CHAPMAN — Swedish Hospital — 10 to 12.

Tuesday, November 12th

A. L. SORESI — Miss Alston's Sanatarium — 9.
JOHN ROGERS — Bellevue Hospital — 9. Operations upon the thyroids.
JOHN DOUGLAS — Bellevue Hospital — 10.
L. V. HOTCHKISS — Bellevue Hospital — 2. Operations on stomach and gall bladder.
E. H. FISKE — Coney Island Hospital — 2 to 4.
R. F. WALMSLEY — Cumberland St. Hospital — 1 to 3.
S. W. PALLISTER — Cumberland St. Hospital — 3 to 5.
W. H. BISHOP — Flower Hospital — 2.
A. S. TAYLOR — Fordham Hospital — 10.
ALEXANDER NICOLL — Fordham Hospital — 2.
EUGENE POOL and PERCY TURNURE — French Hospital — 2.
J. P. WARBASSE — German Hospital (Brooklyn) — 10 to 1.
WILLY MEYER and M. REHLING — German Hospital — 4. Thoracic surgery.
I. S. HAYNES — Harlem Hospital — 2:15.
J. DOWNEY — Holy Family Hospital — 2 to 4.
A. T. BRISTOW — Kings County Hospital — 10 to 12.
T. B. SPENCE — Methodist Episcopal Hospital — 9 to 11.
W. F. CAMPBELL — Methodist Episcopal Hospital — 11 to 1.
R. S. FOWLER — Methodist Episcopal Hospital — 2 to 4.
A. A. BERG — Mt. Sinai Hospital — 9.
M. WARE — Mt. Sinai Hospital — 9.
A. G. GERSTER — Mt. Sinai Hospital — 2.
C. A. ELSBERG and A. S. TAYLOR — Neurological Institute — 2.
FRANK HARTLEY and staff — New York Hospital — 9:30.
E. D. FERRIS — Norwegian Hospital — 10 to 12.
WM. S. BAINBRIDGE — Polyclinic Hospital — 11.
SAMUEL LLOYD — Post Graduate Hospital — 10.
WILLY MEYER — Post Graduate Hospital — 2.
J. F. ERDMANN — Post Graduate Hospital — 3:30.
W. B. DE GARMO — Post Graduate Hospital — 4:30. Hernia clinic.
A. V. S. LAMBERT — Presbyterian Hospital — 9 to 12.
F. HAWKES — Presbyterian Hospital — 2 to 5.
CHARLES H. PECK — Roosevelt Hospital — 9.
GEORGE E. BREWER — Roosevelt Hospital — 2.
FRANZ TOREK and staff — Skin and Cancer Hospital — 9 to 11.
E. J. McENTEE — St. Catherine's Hospital — 9 to 12.
W. A. DOWNES — St. Francis' Hospital — 2:30 to 5.
W. S. SIMMONS — St. John's Hospital — 10 to 12.
J. C. KENNEDY — St. Mary's Hospital (Brooklyn) — 9 to 12.
CHARLES N. DOWD — St. Mary's Hospital — 2:30.
R. J. MORRISON — Williamsburgh Hospital — 9 to 12.
M. L. BODKIN — Williamsburgh Hospital — 2 to 4.

Wednesday, November 13th

JOHN B. WALKER — Bellevue Hospital — 9. Operations for fracture of femur.
C. GOODMAN — Beth Israel Hospital — morning.
H. M. SILVER — Beth Israel Hospital — 2 to 4.
R. W. WESTBROOK — Brooklyn Hospital — 10 to 12.
WILLIAM S. BAINBRIDGE and CLAUDE A. FRINK — Children's Hospital — 9 to 12.
ROBERT DAWBARN, E. M. FOOTE and H. D. COLLINS — City Hospital — 2 to 6.
J. P. MURPHY — Coney Island Hospital — 2 to 4.
J. J. HIGGINS — Fordham Hospital — 10.
WILLIAM P. HEALY — Fordham Hospital — 2.
W. A. DOWNES — General Memorial Hospital — 11. Radical cure of direct inguinal hernia.

CHARLES N. DOWD — General Memorial Hospital — 2:30.
WILLY MEYER and M. REHLING — German Hospital — 9.
F. KAMMERER and DE WITT STETTEN — German Hospital — 2.
W. H. LUCKETT — Harlem Hospital — 1.30.
E. H. FISKE — Holy Family Hospital — 2 to 4.
F. W. MURRAY and staff — Hudson Street Hospital — 2:30.
W. LINDER — Jewish Hospital (Brooklyn) — 9 to 12.
W. L. DUFFIELD — Jewish Hospital (Brooklyn) — 2 to 4.
PARKER SYMS and staff — Lebanon Hospital — 10 and 2.
W. B. BRINSMADE — Long Island College Hospital — 10 to 12.
A. H. BOGART and J. B. BOGART — Methodist Episcopal Hospital — 9 to 11
C. H. GOODRICH and W. A. SHERWOOD — Methodist Episcopal Hospital — 11 to 1.
W. F. HONAN — Metropolitan Hospital — 2.
N. P. RATHBUN — Midwood Hospital — 9 to 12.
A. MOSCHCOWITZ — Mt. Sinai Hospital — 9.
RICHARD LEWISOHN — Mt. Sinai Hospital — 9. Demonstration of a new œsophagoscope.
A. B. JOHNSON and W. A. DOWNES — New York Hospital — 2:30.
L. S. PILCHER and P. M. PILCHER — Pilcher Private Hospital — 9 to 12.
JOHN A. BODINE — Polyclinic Hospital — 11.
JEROME M. LYNCH — Polyclinic Hospital — 1:30 Rectal operations.
J. F. ERDMANN — Post Graduate Hospital — 10.
R. T. MORRIS — Post Graduate Hospital — 2.
JOSEPH A. BLAKE — Presbyterian Hospital — 9 to 12.
ELLSWORTH ELIOT, Jr. — Presbyterian Hospital — 2 to 5.
S. W. PALLISTER — Prospect Heights Hospital — 3 to 5.
CHARLES N. DOWD — Roosevelt Hospital — 9.
WILLIAM DARRACH — Roosevelt Hospital — 2.
JOHN ROGERS — St. Francis' Hospital — 2:30 to 5.
H. B. DELATOUR — St. John's Hospital — 9 to 12.
W. MARTIN — St. Luke's Hospital — 2 to 4.
N. W. GREEN — St. Luke's Hospital — 4 to 6.
B. T. TILTON — St. Mark's Hospital — 9.
C. R. L. PUTNAM — St. Mark's Hospital — 2.
F. S. MATHEWS — St. Mary's Hospital — 9:30.
J. R. KEVIN — St. Mary's Hospital (Brooklyn) — 9 to 12.
GEORGE D. STEWART — St. Vincent's Hospital — 2.
L. A. LYNCH — Swedish Hospital — 10 to 12.

Thursday, November 14th

A. L. SORESI — Miss Alston's Sanatarium — 9.
JOHN B. WALKER — Bellevue Hospital — 9. Operations for femoral and inguinal hernia, and for undescended testes.
JOHN A. HARTWELL — Bellevue Hospital — 2.
J. E. JENNINGS — Brooklyn Hospital — 2 to 4.
C. E. LACK — Coney Island Hospital — 2 to 4.
O. S. RITCH — Cumberland Street Hospital — 1 to 3.
G. H. ILER — Cumberland Street Hospital — 3 to 5.
A. S. TAYLOR — Fordham Hospital — 10.
ALEXANDER NICOLL — Fordham Hospital — 2.
WILLIAM B. COLEY — General Memorial Hospital — 2:30. Results from treatment of inoperable sarcoma.
FRANZ TOREK and G. H. SEMKEN — German Hospital — 9.
O. G. T. KILIANI and HERMANN FISCHER — German Hospital — 2.
J. P. WARBASSE — German Hospital (Brooklyn) — 10 to 1.
I. S. HAYNES — Harlem Hospital — 2:15.
R. SULLIVAN — Holy Family Hospital — 2 to 4.
J. B. BOGART — Kings County Hospital — 10 to 12.
B. T. TILTON — Lincoln Hospital — 8:30.
C. R. L. PUTNAM — Lincoln Hospital — 11.
SETH MILLIKEN, Jr. — Lincoln Hospital — 2.
T. B. SPENCE — Methodist Episcopal Hospital — 9 to 11.
C. H. GOODRICH and W. F. CAMPBELL — Methodist Episcopal Hospital — 11 to 1.
G. S. HARRINGTON — Metropolitan Hospital — 2.
C. A. ELSBERG and A. S. TAYLOR — Neurological Institute — 2.
FRANK HARTLEY and staff — New York Hospital — 9:30.
H. B. DELATOUR — Norwegian Hospital — 9 to 11.
E. D. FERRIS — Norwegian Hospital — 10 to 12.
ALEXANDER LYLE — Polyclinic Hospital — 11.
R. T. MORRIS — Post Graduate Hospital — 10.
SAMUEL LLOYD — Post Graduate Hospital — 2.
W. B. DE GARMO — Post Graduate Hospital — 3:30. Hernia operations.
CLARENCE A. McWILLIAMS — Presbyterian Hospital — 2. Cases illustrating bone transplantation, formation of new nose out of finger. Operative clinic.
N. ROBINSON — Prospect Heights Hospital — 3 to 5.
CHARLES H. PECK — Roosevelt Hospital — 9.
FRED ALBEE — Roosevelt Hospital — 2.
WILLIAM S. BAINBRIDGE and staff — Skin and Cancer Hospital — 9 to 1.
P. HUGHES — St. Catherine's Hospital — 9 to 12.
A. T. BRISTOW — St. John's Hospital — 10 to 1.
E. A. PARKER — St. Mary's Hospital — 9 to 12.
JOSEPH B. BISSELL — St. Vincent's Hospital — 2.
E. A. PARKER — Williamsburgh Hospital — 2 to 4.

Friday, November 15th

W. A. DOWNES — Babies Hospital — 2.
L. V. HOTCHKISS — Bellevue Hospital — 9. Abdominal operations.
GEORGE WOOLSEY — Bellevue Hospital — 9. Operations on stomach and gall bladder.
W. C. WOOD — Brooklyn Hospital — 10 to 12.
J. J. HIGGINS — Fordham Hospital — 10.
WILLIAM P. HEALY — Fordham Hospital — 2.
CHARLES N. DOWD — General Memorial Hospital — 9:30.
WILLY MEYER and M. REHLING — German Hospital — 4. Thoracic surgery.
R. S. FOWLER — German Hospital (Brooklyn) — 10 to 1.
W. H. LUCKETT — Harlem Hospital — 1:30.
F. W. MURRAY and staff — Hudson Street Hospital — 2:30.
W. LINDER — Jewish Hospital (Brooklyn) — 2 to 4.
A. T. BRISTOW — Long Island College Hospital — 10 to 12.
A. H. BOGART and J. B. BOGART — Methodist Episcopal Hospital — 9 to 11.
W. A. SHERWOOD — Methodist Episcopal Hospital — 11 to 1.
W. F. HONAN — Metropolitan Hospital — 2.
C. DUNCAN — Midwood Hospital — 9 to 12.
C. A. ELSBERG — Mt. Sinai Hospital — 9.
W. M. BRICKNER — Mt. Sinai Hospital — 9.

H. LILIENTHAL — Mt. Sinai Hospital — 2.
SIDNEY F. WILCOX — N. Y. Medical College and Hospital for Women — 2:30.
L. S. PILCHER and P. M. PILCHER — Pilcher Private Hospital — 9 to 12.
WM. S. BAINBRIDGE — Polyclinic Hospital — 11.
JEROME M. LYNCH — Polyclinic Hospital — 11.
J. F. ERDMANN — Post Graduate Hospital — 2.
S. G. GANT — Post Graduate Hospital — 3:30. Operations on colon and rectum.
A. V. S. LAMBERT — Roosevelt Hospital — 9.
JAMES I. RUSSELL — Roosevelt Hospital — 2.
GEORGE WOOLSEY and J. A. HARTWELL — Presbyterian Hospital — 2 to 5.
FRANZ TOREK and staff — Skin and Cancer Hospital — 9 to 11.
WILLIAM S. BAINBRIDGE and FRANZ TOREK — Skin and Cancer Hospital — 4 to 6.
M. FIGUEIRA — St. Catherine's Hospital — 9 to 12.
JOHN ROGERS — St. Francis' Hospital — 2:30 to 5.
W. B. BRINSMADE — St. John's Hospital — 9 to 12.
ROBERT ABBE — St. Luke's Hospital — 2 to 4.
W. S. SCHLEY — St. Luke's Hospital — 4 to 6.
O. A. GORDON — St. Mary's Hospital (Brooklyn) — 9 to 12.
CHARLES N. DOWD — St. Mary's Hospital — 2:30.
GEORGE D. STEWART — St. Vincent's Hospital — 2.
W. S. SIMMONS — Swedish Hospital — 10 to 12.
J. G. DICKERT — Williamsburgh Hospital — 10 to 12.
GEORGE T. CHASE — J. Hood Wright Hospital — 10.

Saturday, November 16th

JOSEPH D. BRYANT — Bellevue Hospital — 2.
RICHARD LEWISOHN — Beth Israel Hospital — morning.
H. M. SILVER — Beth Israel Hospital — 2 to 4.
A. E. ISAACS — Beth Israel Hospital — afternoon.
R. W. WESTBROOK — Brooklyn Hospital — 10 to 12.
W. T. HELMUTH — Flower Hospital — 2.
A. S. TAYLOR — Fordham Hospital — 10.
ALEXANDER NICOLL — Fordham Hospital — 2.
F. KAMMERER and DE WITT STETTEN — German Hospital — 9.
WILLY MEYER and M. REHLING — German Hospital — 2.
I. S. HAYNES — Harlem Hospital — 2:15.
C. BARBER — Kings County Hospital — 9 to 11.
T. B. SPENCE — Methodist Episcopal Hospital — 9 to 11.
W. F. CAMPBELL — Methodist Episcopal Hospital — 11 to 1.
R. S. FOWLER — Methodist Episcopal Hospital — 2 to 4.
J. WIENER — Mt. Sinai Hospital — 9.
FRANK HARTLEY and staff — New York Hospital — 9:30.
JOHN A. BODINE — Polyclinic Hospital — 11.
R. T. MORRIS — Post Graduate Hospital — 2.
A. V. S. LAMBERT — Presbyterian Hospital — 9 to 12.
CHARLES H. PECK — Roosevelt Hospital — 9.
GEORGE E. BREWER — Roosevelt Hospital — 2.
WILLIAM S. BAINBRIDGE and staff — Skin and Cancer Hospital — 9 to 1.
W. A. DOWNES — St. Francis' Hospital — 8:30 to 12.
J. A. LEE — St. Mary's Hospital (Brooklyn) — 9 to 12.
JOHN ASPELL — St. Vincent's Hospital — 8:30.
W. F. CAMPBELL — Trinity Hospital — 2 to 5.

Days and Hours to be Announced Later

G. D. STEWART — Bellevue Hospital.
T. A. SMITH — Bellevue Hospital.
JOSEPH D. BRYANT — St. Vincent's Hospital.
J. F. ERDMANN — Gouverneur Hospital.
H. A. HAUBOLD — Harlem Hospital.
J. J. McGRATH — Harlem Hospital.
C. L. GIBSON — St. Luke's Hospital.

GYNECOLOGICAL AND OBSTETRICAL CLINICS

Monday, November 11th

J. BRETTAUER, S. M. BRICKNER and R. T. FRANK — Mount Sinai Hospital — 9 to 2. Gynecological operations.
L. J. LADINSKI — Polyclinic Hospital — 9 to 10. Gynecological operations.
ROBERT WYLIE — Polyclinic Hospital — 3 to 5. Gynecological operations.
CLEMENT CLEVELAND with E. W. PINKHAM — Woman's Hospital — 9 to 11. Gynecological operations.
HERMAN GRAD and W. M. FORD — Woman's Hospital — 9 to 10. Demonstration of Hospital, Laboratories, Technique and after-care. 10 to 11 — Demonstration of postoperative results.
DOUGAL BISSELL with EVERETT M. HAWKS — Woman's Hospital — 2 to 6. Gynecological operations.
GEORGE H. MALLET — General Memorial Hospital — 2 to 6. Gynecological operations.
JAMES N. WEST — Post-Graduate Hospital — 9 to 12 Gynecological operations.
ATTENDING STAFF — Lying-In Hospital — 9 to 10. Demonstration of Hospital, Laboratories, cases, methods, etc.
JAMES A. HARRAR — Lying-In Hospital — 10 to 11. Demonstration of examination of pregnant women and pelvic measurement.
JAMES W. MARKOE and A. B. DAVIS — Lying-In Hospital — 2:30 to 3:30. Obstetrical and gynecological operations.
L. L. DANFORTH — Homeopathic Medical College and Flower Hospital — 5 to 6. Obstetrical operations.
E. P. SWIFT — Hahnemann Hospital — 5:30. Obstetrical operations.
J. CLIFTON EDGAR, or AUSTIN FLINT, JR., or C. C. BARROWS — Manhattan Maternity Hospital — 2 to 3:30. Demonstration of the management and technique of the hospital. Obstetrical operations.
W. H. RANKIN — Coney Island Hospital — 11 to 1. Gynecological operations.
S. J. McNAMARA — Kings County Hospital — 10 to 12. Gynecological operations.
H. B. DELATOUR — Norwegian Hospital — 9 to 11. Gynecological and surgical operations.
J. F. RANKEN — Prospect Heights Hospital — 10 to 12. Gynecological clinic.

Tuesday, November 12th

HOWARD C. TAYLOR with WM. P. HEALY — Roosevelt Hospital — 2:30 to 6. Gynecological operations.

L. J. LADINSKI — Beth Israel Hospital — 9. Gynecological operations.

S. W. BANDLER — Beth Israel Hospital — 2. Gynecological operations.

F. FOERSTER and F. R. OASTLER — German Hospital — 9. Gynecological operations.

G. SEELIGMANN and ARTHUR STEIN — German Hospital — 2. Gynecological operations.

RALPH WALDO and GUSTAV SEELIGMANN — Lebanon Hospital — Gynecological operations.

H. S. STEARNS and C. G. CHILD, JR. — City Hospital — 2. Gynecological operations.

F. KRUG with H. N. VINEBERG and S. WIENER — Mount Sinai Hospital — 9 to 2. Gynecological operations.

LEROY BROUN with R. M. RAWLS — Woman's Hospital — 9 to 12. Gynecological operations.

C. G. CHILD and EVERETT M. HAWKS — Woman's Hospital — 9 to 10. Demonstration of Hospital, Wards, Laboratories and Technique. 10.— Demonstration of postoperative results.

P. F. CHAMBERS with HERMAN GRAD — Woman's Hospital — 2 to 6. Gynecological operations.

JOSEPH C. TAYLOR — Polyclinic Hospital — 8 to 10. Gynecological operations.

BROOKS H. WELLS — Polyclinic Hospital — 3 to 5. Gynecological operations.

G. G. WARD, JR. — Post-Graduate Hospital — 9 to 12. Gynecological operations.

H. D. FURNISS — Post Graduate Hospital—2. Cystoscopy and ureteral catheterization.

E. G. TUTTLE — Homeopathic College Hospital and Flower Hospital — 10 to 12. Gynecological operations.

HOMER I. OSTROM — Metropolitan Hospital, Blackwell's Island — 2:30. Gynecological operations.

GEORGE WATSON ROBERTS — Hahnemann Hospital — 8:30. Gynecological operations.

WM. F. HONAN — Hahnemann Hospital — 2:30. Gynecological operations.

EDWIN B. CRAGIN — Sloane Hospital for Women — 3. Obstetrical operations.

ATTENDING STAFF — Lying-In Hospital — 9 to 10. Demonstration of Laboratories, Wards, After-care, Museums, etc.

WILLIAM A. MORGAN — Lying-In Hospital — 10 to 11. Demonstration of conduct of labor, position, technique.

JAMES W. MARKOE and A. B. DAVIS — Lying-In Hospital — 2:30 to 3:30. Obstetrical and gynecological operations.

J. CLIFTON EDGAR, or AUSTIN FLINT, JR., or C. C. BARROWS — Manhattan Maternity Hospital — 2 to 3:30. Demonstration of the management and technique of the hospital.

C. C. BARROWS and GEORGE D. HAMLEN — Bellevue Hospital. Gynecological operations.

ROBERT H. WYLIE and G. B. LEE — Bellevue Hospital — 9. Gynecological operations. Demonstration of after-treatment of operative cases, and of treatment of patients before operation.

CAROLINE S. FINLEY — New York Infirmary for Women and Children — 2:30. Obstetrical operations.

G. McNAUGHTON — Long Island College Hospital — 9 to 12. Gynecological operations.

J. O. POLAK — Jewish Hospital (Brooklyn) — 9 to 12. 2 to 6. Gynecological operations.

O. P. HUMPSTONE — Jewish Hospital (Brooklyn) — 2 to 4. Obstetrical operations.

RALPH H. POMEROY — Brooklyn Hospital — 9 to 12:30. Gynecological operations.

W. H. CARY — Brooklyn Hospital — 2 to 4. Gynecological clinic; model dispensary, just completed.

A. A. HUSSEY — Brooklyn Hospital — 2 to 4. Obstetrical operations.

H. M. MILLS — Coney Island Hospital — 11 to 1. Gynecological operations.

E. D. FERRIS — Norwegian Hospital — 10 to 12. Gynecological and surgical operations.

J. F. RANKEN — Prospect Heights Hospital — 10 to 12. Gynecological clinic.

L. G. BALDWIN — St. Peter's Hospital — 9 to 12. Gynecological operations.

J. F. TODD — St. Peter's Hospital — 11 to 1. Gynecological operations.

C. DUNCAN — Swedish Hospital — 10 to 12. Gynecological operations.

H. A. WADE — Williamsburgh Hospital — 1 to 3. Gynecological operations.

Wednesday, November 13th

EDWIN B. CRAGIN — Sloane Hospital for Women — 3. Gynecological operations.

H. J. BOLDT — Post-Graduate Hospital — 9. Gynecological operations.

J. RIDDLE GOFFE — New York Polyclinic Hospital — 8. Gynecological operations.

CHAS. C. BARROWS — Bellevue Hospital — 2. Gynecological operations.

CLINTON L. BAGG — Metropolitan Hospital (Homeopathic) — 2:30. Gynecological operations.

AUSTIN FLINT, JR., with W. M. FORD — Woman's Hospital — 9 to 12. Gynecological operations.

C. G. CHILD, JR., and HERMAN GRAD — Woman's Hospital — 9 to 10. Demonstration of Hospital, Wards, Laboratories and Technique. 11.— Demonstration of postoperative results.

CLEMENT CLEVELAND with E. W. PINKHAM — Woman's Hospital — 2 to 6. Gynecological operations.

ATTENDING STAFF — Lying-In Hospital — 9 to 10. Demonstration of Wards, Laboratories, After-care, Museums, etc.

ROSS McPHERSON — Lying-In Hospital — 10 to 11. Demonstration of postpartum treatment.

JAMES W. MARKOE and A. B. DAVIS — Lying-In Hospital — 2:30 to 3:30. Gynecological and obstetrical operations.

LEROY BROUN — Manhattan State Hospital — 2:30. Gynecological operations.

SAMUEL BARLOW MOORE — Metropolitan Hospital (Homeopathic) — 2:30. Obstetrical operations.

J. CLIFTON EDGAR, or AUSTIN FLINT, JR., or C. C. BARROWS — Manhattan Maternity Hospital — 2 to 3:30. Demonstration of the management and technique of the hospital. Obstetrical operations.

H. C. COE and W. E. STUDDIFORD — Bellevue Hospital — 9. Gynecological operations. Demonstration of after-care of operative cases, and of treatment of patients before operation.

ARTHUR STEIN — German Hospital Dispensary — 3 to 4:30. Gynecological cystoscopy, examination of bladder, catheterization of ureters, etc.

MARY D. RUSHMORE — New York Infirmary for Women and Children—2:30. Gynecological operations.

E. MAYNE and J. C. MACEVITT — Coney Island Hospital — 11 to 1. Gynecological operations.

C. BURNHAM — Cumberland Street Hospital — 1 to 3. Gynecological operations.

F. WEISBROD — German Hospital (Brooklyn) — 10 to 1. Gynecological operations.

G. McNAUGHTON, C. R. HYDE and A. M. JUDD — Long Island College Hospital — 9 to 12. Gynecological operations.

H. B. DELATOUR — St. John's Hospital — 9 to 12. Gynecological and surgical operations.

J. C. MACEVITT — St. Mary's Hospital — 2 to 4. Gynecological operations.

Thursday, November 14th

C. C. BARROWS and GEORGE D. HAMLEN — Bellevue Hospital — 9. Gynecological operations. Demonstration of after-treatment of operative cases, and of treatment of patients before operation.

L. J. LADINSKI — Beth Israel Hospital — 2. Gynecological operations.

S. W. BANDLER — Beth Israel Hospital — 9. Gynecological operations.

HOWARD C. TAYLOR with WILLIAM P. HEALY — Roosevelt Hospital — 2:30. Gynecological operations.

HENRY C. COE — General Memorial Hospital — 9. Gynecological operations.

GEORGE H. MALLETT — General Memorial Hospital — 11. Gynecological operations.

E. H. GRANDIN — Columbus Hospital — 2. Gynecological operations.

L. J. LADINSKI — Polyclinic Hospital — 8 to 10. Gynecological operations.

ROBERT WYLIE — Polyclinic Hospital — 3 to 5. Gynecological operations.

GUSTAV SEELIGMANN and RALPH WALDO — Lebanon Hospital — 9 and 2. Gynecological operations.

HOMER I. OSTROM — Metropolitan Hospital (Homeopathic) — 2:30. Gynecological operations.

F. KRUG, H. N. VINEBERG, and S. WIENER — Mount Sinai Hospital — 9. Gynecological operations.

J. RIDDLE GOFFE with C. G. CHILD, JR. — Woman's Hospital — 9. Gynecological operations.

LEROY BROUN with REGINALD M. RAWLS — Woman's Hospital — 2. Gynecological operations.

W. M. FORD and EVERETT M. HAWKS — Woman's Hospital — 9 to 10. Demonstration of Hospital, Wards, Laboratories, Technique, etc. 10 to 11. — Demonstration of postoperative results.

ATTENDING STAFF — Lying-In Hospital — 9 to 10. Demonstration of Wards, Laboratories, etc.

GEORGE W. KOSMAK — Lying-In Hospital — 10 to 11. Demonstration of care of cases of labor at patients' homes.

JAMES W. MARKOE and A. B. DAVIS — Lying-In Hospital — 2:30 to 3:30. Gynecological and obstetrical operations.

C. G. CHILD, JR., or H. S. STEARNS — City Hospital — 2. Gynecological operations.

F. A. DORMAN — City Hospital — 2. Obstetrical operations.

JAMES D. VOORHEES — Sloane Hospital for Women — 2. Obstetrical operations.

P. C. THOMAS — Hahnemann Hospital — 2:30. Obstetrical clinic.

J. CLIFTON EDGAR, or AUSTIN FLINT, JR., or C. C. BARROWS — Manhattan Maternity Hospital — 2 to 3:30. Demonstration of the management and technique of the hospital. Obstetrical operations.

JAMES N. WEST — Post-Graduate Hospital — 9 to 12. Gynecological operations.

H. D. FURNISS — Post Graduate Hospital — 2. Lantern slide demonstration of argyrol and collargol radiographs of the kidneys and ureters.

R. L. DICKINSON — Brooklyn Hospital — 9 to 12. Gynecological operations.

A. A. HUSSEY — Brooklyn Hospital — 2 to 4. Obstetrical operations.

E. J. MORRIS and V. L. ZIMMERMAN — Holy Family Hospital — 10 to 12. Gynecological operations.

G. McNAUGHTON — Jewish Hospital (Brooklyn) — 9 to 12. Gynecological and obstetrical operations.

R. M. BEACH — Jewish Hospital (Brooklyn) — 2 to 4. Obstetrical operations.

J. O. POLAK, F. C. HOLDEN and N. P. GEIS — Long Island College Hospital — 9 to 12. Gynecological and obstetrical operations.

H. B. DELATOUR — Norwegian Hospital — 9 to 11. Gynecological and surgical operations.

E. D. FERRIS — Norwegian Hospital — 10 to 12. Gynecological and surgical operations.

J. F. RANKEN — Prospect Heights Hospital — 10 to 12. Gynecological clinic.

A. T. BRISTOW — St. John's Hospital — 10 to 1. Gynecological and surgical operations.

L. G. BALDWIN — St. Peter's Hospital — 9 to 12. Gynecological operations.

J. F. TODD — St. Peter's Hospital — 11 to 1. Gynecological operations.

A. M. JUDD — Swedish Hospital — 10 to 12. Gynecological and obstetrical operations.

J. B. DOWD — Williamsburgh Hospital — 2 to 4. Gynecological operations.

Friday, November 15th

G. SEELIGMANN and A. STEIN — German Hospital — 9. Gynecological operations.

F. FOERSTER and F. R. OASTLER — German Hospital — 2. Gynecological operations.

GEORGE GRAY WARD, JR. — Post-Graduate Hospital — 9 to 12. Gynecological operations.

C. F. ADAMS — Columbus Hospital — 2. Gynecological operations.

CLINTON L. BAGG — Metropolitan Hospital (Homeopathic) — 2:30. Gynecological operations.

W. G. CRUMP — Homeopathic Medical College and Flower Hospital — 2 to 4. Gynecological operations.

JOSEPH C. TAYLOR — Polyclinic Hospital — 8 to 10. Gynecological operations.

J. BRETTAUER, S. M. BRICKNER and R. T. FRANK — Mount Sinai Hospital — 9. Gynecological operations.

P. F. CHAMBERS with HERMAN GRAD — Woman's Hospital — 9 to 11. Gynecological operations.

R. M. RAWLS and E. W. PINKHAM — Woman's Hospital — 9 to 10. Demonstration of Hospital, Laboratories, Technique and After-care. 10 to 11. — Demonstration of postoperative results.

J. RIDDLE GOFFE with C. G. CHILD, JR. — Woman's Hospital — 2 to 6. Gynecological operations.

LEROY BROUN — Manhattan State Hospital — 2:30. Gynecological operations.

ATTENDING STAFF — Lying-In Hospital — 9 to 10. Demonstration of Wards, Laboratories, etc.

C. F. JELLINGHAUS — Lying-In Hospital — 10 to 11. Demonstration of postoperative cases.

JAMES W. MARKOE and A. B. DAVIS — Lying-In Hospital — 2:30 to 3:30. Gynecological and obstetrical operations.

F. A. DORMAN — Sloane Hospital for Women — 3. Obstetrical clinic.

JOHN HUDSON STORER — Metropolitan Hospital (Homeopathic) — 2:30. Obstetrical clinic.

L. L. DANFORTH — Homeopathic Medical College and Flower Hospital — 5 to 6. Obstetrical clinic.

J. CLIFTON EDGAR, or AUSTIN FLINT, JR., or C. C. BARROWS — Manhattan Maternity — 2 to 3. Demonstration of the management and technique of the hospital. Obstetrical operations.

ROBERT H. WYLIE and G. B. LEE — Bellevue Hospital — 9. Gynecological operations. Demonstration of after-treatment of operative cases, and of treatment of patients before operation.

R. L. DICKINSON — Brooklyn Hospital — 2 to 4. Gynecological operations.

W. H. PIERSON — Cumberland Street Hospital — 1 to 3. Gynecological operations.

H. C. ALLEN and T. A. BUYS — Cumberland Street Hospital — 3 to 5. Obstetrical operations.

J. F. RANKEN — Cumberland Street Hospital — 3 to 5. Gynecological operations.

J. M. WINFIELD — Kings County Hospital — 10 to 12. Syphilis and cancer clinic.

J. F. RANKEN — Prospect Heights Hospital — 10 to 12. Gynecological clinic.

W. B. BRINSMADE — St. John's Hospital — 9 to 12. Gynecological and surgical operations.

J. P. GLYNN — St. Mary's Hospital — 2 to 4. Gynecological operations.

C. A. GORDON — Williamsburgh Hospital — 2 to 4. Gynecological operations.

Saturday, November 16th

HOWARD C. TAYLOR with WILLIAM P HEALY — Roosevelt Hospital — 2:30. Gynecological operations.

H. J BOLDT — Post-Graduate Hospital — 9 to 12. Gynecological operations.

H. D. FURNISS—Post Graduate Hospital—2. Cystoscopy and ureteral catheterization.

EDWIN B. CRAGIN — Sloane Hospital for Women — 3. Gynecological operations.

C. G CHILD — Polyclinic Hospital — 8 to 10. Gynecological operations.

BROOKS H. WELLS — Polyclinic Hospital — 3 to 5. Gynecological operations.

G. WATSON ROBERTS — Hahnemann Hospital — 8:30. Gynecological operations.

DOUGAL BISSELL with EVERETT M. HAWKS — Woman's Hospital — 9. Gynecological operations.

R. M. RAWLS and E. W. PINKHAM — Woman's Hospital — 9 to 10. Demonstration of Hospital, Laboratories, Technique, and After-care. 10.— Demonstration of postoperative cases.

AUSTIN FLINT, JR., with W. M. FORD — Woman's Hospital — 2 to 6. Gynecological operations.

ARTHUR STEIN — German Hospital Dispensary — 3 to 4:30. Gynecological cystoscopy, examination of bladder, catheterization of ureters, etc.

ATTENDING STAFF — Lying-In Hospital — 9 to 10. Demonstration of Wards, Laboratories, After-care, Museums, etc.

GEORGE W. KOSMAK — Lying-In Hospital — 10 to 11. Demonstration of new-born children, treatment of eyes, etc.

JAMES W. MARKOE and A. B. DAVIS — Lying-In Hospital — 2:30 to 3:30. Gynecological and obstetrical operations.

J. CLIFTON EDGAR, or AUSTIN FLINT, JR., or C C. BARROWS — Manhattan Maternity Hospital — 2 to 3:30. Demonstration of the management and technique of the hospital. Obstetrical clinics.

H. C. COE and W. E. STUDDIFORD — Bellevue Hospital — 9. Gynecological operations. Demonstrations of the after-treatment of operative cases, and of the treatment of patients before operation, etc.

F. WEISBROD — German Hospital (Brooklyn) — 10 to 1. Gynecological operations.

J. O. POLAK — Jewish Hospital (Brooklyn) — 9 to 12. Gynecological operations.

A. M. JUDD — Jewish Hospital (Brooklyn) — 9 to 12. Gynecological operations.

O. P. HUMPSTONE — Jewish Hospital (Brooklyn) — 2 to 4. Obstetrical operations.

E. PALMER, C. R. HYDE and W. P. POOL — Long Island College Hospital — 9 to 12. Gynecological operations.

ORTHOPEDIC SURGERY

Monday, November 11th

VIRGIL P. GIBNEY and ARTHUR H. CILLEY — Hospital for Ruptured and Crippled — 8:30.
RUSSELL A. HIBBS — Orthopedic Hospital — 8:30.
FRED H. ALBEE — Roosevelt Hospital — 9:30 to 11.
JAMES P. FISKE — New York Hospital — 10 to 11.
CHARLES H. JAEGER — Vanderbilt Clinic — 10 to 12.
HOMER GIBNEY — New York School of Clinical Medicine — 12 to 2.
R. H. SAYRE — University and Bellevue Hospital Medical College — 1 to 3.
FRED H. ALBEE — Cornell University — 1 to 3.
WISNER R. TOWNSEND — Hospital for Ruptured and Crippled — 1 to 3.
DEXTER D. ASHLEY — German Polyclinic — 1 to 3.
P. W. NATHAN — Mt. Sinai Hospital — 1 to 3.
B. P. FARRELL — Orthopedic Hospital — 1:30 to 4.
HENRY LING TAYLOR — Post Graduate Hospital — 4:30 to 5:30.

Tuesday, November 12th

RUSSELL A. HIBBS — Orthopedic Hospital — 8:30 to 12
VIRGIL P. GIBNEY and ROYAL WHITMAN — Hospital for Ruptured and Crippled — 8:30 to 12.
FRED H. ALBEE — Roosevelt Hospital — 9:30 to 11.
HENRY W. FRAUENTHAL — Hospital for Deformities and Joint Diseases — 9 to 11.
IRVING D. STEINHARDT — New York Hospital — 10 to 11.
CHARLES H. JAEGER — Vanderbilt Clinic — 10 to 12.
ROYAL WHITMAN — Hospital for Ruptured and Crippled — 1 to 3.
CARL R. KEPPLER — German Polyclinic — 1 to 3.
P. W. ROBERTS — Mt. Sinai Hospital — 1 to 3.
H. J. BOGARDUS — Orthopedic Hospital — 1:30 to 4.
W. B. THOMPSON — Polyclinic Hospital — 4:30 to 5:30.
T. HALSTED MYERS — St. Luke's Hospital — 2 to 4.
J. M. CLAYLAND — St. Mary's Hospital (Brooklyn — 1 to 4.
CHARLES OGILVY — Post Graduate Hospital — 4:30 to 5:30.

Wednesday, November 13th

VIRGIL P. GIBNEY and ARTHUR H. CILLEY — Hospital for Ruptured and Crippled — 8:30.
RUSSELL A. HIBBS — Orthopedic Hospital — 8:30.
FRED H. ALBEE — Roosevelt Hospital — 9:30 to 11.
JAMES P. FISKE — New York Hospital — 10 to 11.
CHARLES H. JAEGER — Vanderbilt Clinic — 10 to 12.
HOMER GIBNEY — New York School of Clinical Medicine — 12 to 2.
R. H. SAYRE — University and Bellevue Hospital Medical College — 1 to 3.
FRED H. ALBEE — Cornell University — 1 to 3.
WISNER R. TOWNSEND — Hospital for Ruptured and Crippled — 1 to 3.
P. W. NATHAN — Mt. Sinai Hospital — 1 to 3.
DEXTER D. ASHLEY — German Polyclinic — 1 to 3.
B. P. FARRELL — Orthopedic Hospital — 1:30 to 4.
HENRY LING TAYLOR — Post Graduate Hospital — 4:30 to 5:30.

Thursday, November 14th

CARL R. KEPPLER — Fordham Hospital — 8:30.
VIRGIL P. GIBNEY and ARTHUR H. CILLEY — Hospital for Ruptured and Crippled — 8:30.
RUSSELL A. HIBBS — Orthopedic Hospital — 8:30.
HENRY W. FRAUENTHAL — Hospital for Deformities and Joint Diseases — 9 to 11.
CHARLES A. OGILVY and A. S. TAYLOR — Randall's Island Hospital — 9.
IRVING D. STEINHARDT — New York Hospital — 10 to 11.
CARL R. KEPPLER — Fordham Hospital — 10 to 11.
CHARLES H. JAEGER — Vanderbilt Clinic — 10 to 12.
ROYAL WHITMAN — Hospital for Ruptured and Crippled — 1 to 3.
CARL R. KEPPLER — German Polyclinic — 1 to 3.
P. W. ROBERTS — Mt. Sinai Hospital — 1 to 3.
H. J. BOGARDUS — Orthopedic Hospital — 1:30 to 4.
FRED H. ALBEE — Roosevelt Hospital — 2.
WALTER TRUSLOW — Methodist Episcopal Hospital (Brooklyn) — 2 to 3.
CHARLTON WALLACE — Polyclinic Hospital — 4:30.
CHARLES OGILVY — Post Graduate Hospital — 4:30.

Friday, November 15th

WILLIAM B. COLEY and JOHN B. WALKER — Hospital for Ruptured and Crippled — 8:30. Hernia clinic.
RUSSELL A. HIBBS — Orthopedic Hospital — 8:30.
FRED H ALBEE — Roosevelt Hospital — 9:30 to 11.
JAMES P. FISKE — New York Hospital — 10 to 11.
CHARLES H. JAEGER — Vanderbilt Clinic — 10 to 12.
HOMER GIBNEY — New York School of Clinical Medicine — 12 to 2.
WISNER R. TOWNSEND — Hospital for Ruptured and Crippled — 1 to 3.
FRED H. ALBEE — Cornell University — 1 to 3.
R. H. SAYRE — University and Bellevue Hospital Medical College — 1 to 3.
P. W. NATHAN — Mt Sinai Hospital — 1 to 3.
DEXTER D. ASHLEY — German Polyclinic — 1 to 3.
B. P. FARRELL — Orthopedic Hospital — 1:30 to 4.
T. HALSTED MYERS — St. Luke's Hospital — 2 to 4.
CHARLES D. NAPIER and WALTER TRUSLOW — Kings County Hospital (Brooklyn) — 3 to 5.
FRED H. ALBEE — Post Graduate Hospital — 4:30 to 5:30.

Saturday, November 16th

RUSSELL A. HIBBS — Orthopedic Hospital — 8:30.
VIRGIL P. GIBNEY and ARTHUR H. CILLEY — Hospital for Ruptured and Crippled — 8:30.
FRED H. ALBEE — Roosevelt Hospital — 9:30 to 11.
IRVING D. STEINHARDT — New York Hospital — 10 to 11.
CHARLES H. JAEGER — Vanderbilt Clinic — 10 to 12.
P. W. ROBERTS — Mt. Sinai Hospital — 1 to 3.
ROYAL WHITMAN — Hospital for Ruptured and Crippled — 1 to 3.
FRED H. ALBEE — Cornell University — 1 to 3.
CARL R. KEPPLER — German Polyclinic — 1 to 3.
H. J. BOGARDUS — Orthopedic Hospital — 1:30 to 4.
ROYAL WHITMAN — Polyclinic Hospital — 4:30.
CHARLES OGILVY — Post Graduate Hospital — 4:30.

GENITO-URINARY SURGICAL CLINICS

NEW YORK CITY

EDWARD L. KEYES, JR. — Bellevue Hospital — Nov. 16, 9 A. M. Operative clinic.
A. T. OSGOOD — Bellevue Hospital. Operative clinic.
J. RAYNOR HAYDEN — Bellevue Hospital — Nov. 16, 2 P. M. Operative clinic.
J. BAYARD CLARKE — Bellevue Hospital. Operative clinic.
J. F. McCARTHY — Bellevue Hospital. Operative clinic.
EUGENE FULLER — City Hospital — Nov. 13 and 16, 2 P. M. Surgery of the seminal vesicles.
FRANCIS CARTER WOOD — Columbia University, Medical Department. Exhibition of pathological genito-urinary specimens.
RAMON GUITERAS — Columbus Hospital. Operative clinic.
WILLY MEYER — German Hospital. Operative clinic.
GEORGE K. SWINBURNE — Good Samaritan Dispensary. Operative clinic.
J. F. ERDMANN — Gouverneur Hospital. Operative clinic (kidney).
BUKK G. CARLETON — Hahnemann Hospital — Nov. 12, 2 P. M. Operative clinic.
SPRAGUE CARLETON — Hahnemann Hospital. Operative clinic.
J. J. MOREHEAD — Harlem Hospital. Operative clinic.
BUKK G. CARLETON — Flower Hospital. Operative clinic.
SPRAGUE CARLETON — Flower Hospital — Nov. 12 and 16. Operative clinic.
CHARLES H. CHETWOOD — J. Hood Wright Hospital. Operative clinic.
BUKK G. CARLETON — Metropolitan Hospital — Nov. 11 and 15. Operative clinic.
SPRAGUE CARLETON — Metropolitan Hospital. Operative clinic.
EDWIN BEER — Mt. Sinai Hospital. Operative clinic.
LEO BUERGER — Mt. Sinai Hospital — Nov. 11, 9 A. M., general clinic; Nov. 13, 2 P. M., operative clinic.
HOWARD LILIENTHAL — Mt. Sinai Hospital. Operative clinic.
FRED S. MANDELBAUM — Mt. Sinai Hospital — Nov. 11, 9 A. M. Genito-urinary pathology.
HERMAN GOLDENBERG — Mt. Sinai Hospital. Treatment of lues.
J. BENTLEY SQUIER — New York City Home Hospital. Operative clinic.
K. B. PAGE — Peoples Hospital. Operative clinic.
A. L. WOLBARST — Peoples Hospital. Demonstration of urinary tests.
CHARLES H. CHETWOOD — Polyclinic Hospital. General clinic daily.
J. BENTLEY SQUIER — Post Graduate Hospital — Nov. 13, 12 M., operative clinic (prostatic surgery). General clinic daily.
EUGENE FULLER — Post Graduate Hospital. Operative clinic.
RAMON GUITERAS — Post Graduate Hospital. Operative clinic (extrophy of bladder).
J. F. ERDMANN — Post Graduate Hospital. Operative clinic (kidney surgery).
J. F. McCARTHY — Post Graduate Hospital. Operative cystoscopy.
JAMES PEDERSEN — Post Graduate Hospital. Clinical teaching.
C. G. BANDLER—Post Graduate Hospital. General clinic.
C. A. McWILLIAMS — Presbyterian Hospital. Operative clinic.
GEORGE E. BREWER — Roosevelt Hospital. Operative clinic (kidney surgery).
WILLIAM B. COLEY — Ruptured and Crippled Hospital. Operative clinic (undescended testicle).
JOHN B. WALKER — Ruptured and Crippled Hospital. Operative clinic.
FRANCIS C. EDGERTON — St. Francis Hospital. Operative clinic.
JOHN PATRICK McGOWAN — St. Bartholomew's clinic. Demonstration.
E. E. SMITH — Smith Private Laboratory. Demonstration of Wasserman reaction.
FREDERICK E. SONDERN — Sondern Private Laboratory. Demonstration of laboratory technique in genito-urinary diagnosis.
J. BENTLEY SQUIER — Sailors' Snug Harbor Hospital. Operative clinic.
R. N. SEVERANCE — Sailors' Snug Harbor Hospital. Operative clinic.
J. RAYNOR HAYDEN — Vanderbilt Clinic. General clinic daily.
FREDERICK BIERHOFF — West Side German Dispensary. Modern methods of dispensary treatments.

BROOKLYN

N. P. RATHBUN — Brooklyn Hospital — Nov. 11, 13 and 15, 1 to 3. General clinics.
W. R. ISZARD — Cumberland Street Hospital — Nov. 11, 9 to 11. General clinic.
B. HARRIS — German Hospital (Brooklyn) — Nov. 11, 10. General clinic.
V. H. PENTLARGE — Jewish Hospital — Nov. 11, 13 and 15, 2 to 4. General clinics.
H. E. FRASER — Kings County Hospital — Nov. 16, 2 to 4. Operative clinic.
H. H. MORTON — Long Island College Hospital — Nov. 11, 2 to 4; Nov. 14, 10 to 12. Kings County Hospital, Nov. 13, 10 to 12. Operative clinics.
J. S. READ, P. M. PILCHER, W. R. ISZARD, B. HARRIS and R. DURHAM — Long Island College Hospital — Nov. 15, 2 to 4. General clinic.
J. STURDIVANT READ — Long Island Island College Hospital. Cystoscopic demonstrations.
R. DURHAM — Methodist Episcopal Hospital — Nov. 13, 11 to 1. General clinic.
PAUL M. PILCHER — Pilcher Private Hospital. Operative clinic (renal, vesical and prostatic cases).
P. M. PILCHER — St. John's Hospital — Nov. 14, 10 to 12. General clinic.

RADIOLOGY

Monday, November 11th

LEWIS GREGORY COLE — Private Laboratory — Afternoon. Stomach, duodenum and œsophagus.

ARTHUR F. HOLDING — Cornell University Medical College — 1:30 to 3:20. Fulguration and treatment. Post Graduate Hospital — 3 to 5. Fluoroscopy of the gastro-intestinal tract.

BYRON CLARY DARLING — Private Laboratory — Morning. Bones and joints. Ruptured and Crippled Hospital — 3 to 4.

WILLIAM H. STEWART — Harlem Hospital — Morning. Fractures, especially of the skull. German Hospital — 11 to 12. Recent advances in X-ray diagnosis.

FREDERICK M. LAW — Manhattan Eye and Ear Hospital — 1 to 3. Accessory sinuses, mastoid, localization of foreign bodies in the eye.

ARCHIBALD BUSBY — New York Hospital — 3 to 5. Bone lesions.

FRED H. ALBEE — Post Graduate Hospital — 9 to 10. Bone and joint lesions.

ISAAC SETH HIRSCH — Bellevue Hospital — Morning. Technique. Afternoon. Demonstration of plates.

CHARLES M. CALDWELL and DR. STEWART — Presbyterian Hospital — Afternoon. Stomach, colon and chest, especially stereoscopically.

LEOPOLD JACHES — Mt. Sinai Hospital — 9 to 10:30 and 3 to 5. Gastro-intestinal examination (with Mr. Thomas Scholz).

ADONIRAM JUDSON QUIMBY — Private Laboratory — 9 to 10. Chest. Throat, Nose and Lung Hospital — 2 to 3. Accessory sinuses.

EDWARD LEAMING — Roosevelt Hospital — 3 to 5. Kidneys, gastro-intestinal tract, pyelography.

LEON T. LEWALD — St. Luke's Hospital — Morning. Technique. Gibb's Laboratory — Afternoon. Colon.

GEORGE M. McKEE and JOHN REMER — Private Laboratory — 2 to 4. Demonstration of treatments, together with radiographic work.

Tuesday, November 12th

ANTHONY BASSLER — Private Laboratory — 3. Gastro-intestinal cases, their laboratory, X-ray, operative and post mortem findings.

CHARLES M. CALDWELL — Private Laboratory — 3 to 5. Sinuses.

LEWIS GREGORY COLE — Private Laboratory — Afternoon. Stomach, duodenum and œsophagus.

ARTHUR F. HOLDING — Cornell University Medical College — 1:30 to 2:30. Fulguration and treatment. Post Graduate Hospital — 3 to 5. Fluoroscopy of the gastro-intestinal tract.

BYRON CLARY DARLING — Private Laboratory — Morning. Bones and joints.

ISAAC SETH HIRSCH — Bellevue Hospital — Morning. Technique. Afternoon. Demonstration of plates.

WILLIAM DIEFFENBACH — Private Laboratory — 3 to 5. Diseases of the osseous system, including constitutional and infectious diseases of bone; also benign and malignant neoplasms of bone.

FREDERICK M. LAW — Manhattan Eye and Ear Hospital — 1 to 3. Accessory sinuses, mastoid, localization of foreign bodies in the eye.

LEOPOLD JACHES — Mt. Sinai Hospital — 9 to 10:30 and 3 to 5. Examinations of the chest, mainly heart (orthodiagraphy). With Dr. Harry Wheeler.

ARCHIBALD BUSBY — New York Hospital — 3 to 5. Bone lesions.

WILLIAM H. STEWART — German Hospital — 11 to 12. Recent advances in X-ray diagnosis.

CHARLES M. CALDWELL and DR. STEWART — Presbyterian Hospital — Afternoon. Stomach, colon and chest, especially stereoscopically.

ADONIRAM JUDSON QUIMBY — Private Laboratory — 9 to 10. Chest. Foundling Hospital — 1 to 2. Epilation. Throat, Nose and Lung Hospital — 2 to 3. Accessory sinuses.

EDWARD LEAMING — Roosevelt Hospital — 3 to 5. Kidneys, gastro-intestinal tract, pyelography.

LEON T. LEWALD — St. Luke's Hospital — Morning. Technique. Gibb's Laboratory — Afternoon — Colon.

Wednesday, November 13th

CHARLES M. CALDWELL — Private Laboratory — 3 to 5. Sinuses.

ANTHONY BASSLER — Private Laboratory — 3. Gastro-intestinal cases, their laboratory, X-ray, operative and post mortem findings.

LEWIS GREGORY COLE — Private Laboratory — Afternoon. Stomach, duodenum and œsophagus.

ARTHUR F. HOLDING — Cornell University Medical College — 1:30 to 2:30. Fulguration and treatment. Post Graduate Hospital — 3 to 5. Fluoroscopy of the gastro-intestinal tract.

BYRON CLARY DARLING — Private Laboratory — Morning. Bones and joints. Ruptured and Crippled Hospital — 3 to 4. St. Vincent's Hospital — 4 to 5.

WILLIAM H. STEWART—Harlem Hospital—Morning. Fractures, especially of the skull. German Hospital —11 to 12. Recent advances in X-ray diagnosis.

LEOPOLD JACHES — Private Laboratory — 3 to 5. Clinic.

GEORGE M. McKEE and JOHN REMER — Private Laboratory — 2 to 4. Demonstration of treatments, together with radiographic work.

FREDERICK M. LAW — Manhattan Eye and Ear Hospital — 1 to 3. Accessory sinuses, mastoid, localization of foreign bodies in the eye.

CHARLES M. CALDWELL and DR. STEWART — Presbyterian Hospital — Afternoon. Stomach, colon and chest, especially steroscopically.

ADONIRAM JUDSON QUIMBY — Private Laboratory — 9 to 10. Chest. Throat, Nose and Lung Hospital — 2 to 3. Accessory sinuses.

ISAAC SETH HIRSCH — Bellevue Hospital — Morning. Technique. Afternoon. Demonstration of plates.

EDWARD LEAMING — Roosevelt Hospital — 3 to 5. Kidneys, gastro-intestinal tract, pyelography.

LEON T. LEWALD — St. Luke's Hospital — Morning. Technique. Gibb's Laboratory — Afternoon. Colon.

FRED H. ALBEE — Post Graduate Hospital — 9 to 10. Bone and joint lesions.

SINCLAIR TOUSEY — Private Laboratory — 12 to 1. Measurement of the intensity of the X-ray with a view to accurate dosage in radiotherapy and safety in radiography.

Thursday, November 14th

LEWIS GREGORY COLE — Private Laboratory — Afternoon. Stomach, duodenum and œsophagus.

CHARLES M. CALDWELL — Private Laboratory — 3 to 5. Sinuses.

ARTHUR F. HOLDING — Cornell University Medical College — 1:30 to 2:30. Fulguration and treatment. Post Graduate Hospital — 3 to 5. Fluoroscopy of the gastro-intestinal tract.

BYRON CLARY DARLING — Private Laboratory — Morning. Bones and joints.
WILLIAM DIEFFENBACH — Private Laboratory — 3 to 5. Diseases of the osseous system, including constitutional and infectious diseases of bone; also benign and malignant neoplasms of bone.
WILLIAM H. STEWART — German Hospital — 11 to 12. Recent advances in X-ray diagnosis.
FREDERICK M. LAW — Manhattan Eye and Ear Hospital — 1 to 3. Accessory sinuses, mastoid, localization of foreign bodies in the eye.
LEOPOLD JACHES — Mt. Sinai Hospital — 9 to 10:30 and 3 to 5. General conditions including therapy. (With Mr. Thomas Scholz and Dr. Samuel Stern.)
CHARLES M. CALDWELL and DR. STEWART — Presbyterian Hospital — Afternoon. Stomach, colon and chest, especially stereoscopically.
ADONIRAM JUDSON QUIMBY — Private Laboratory — 9 to 10. Chest. Foundling Hospital — 1 to 2. Epilation. Throat, Nose and Lung Hospital — 2 to 3. Accessory sinuses.
EDWARD LEAMING — Roosevelt Hospital — 3 to 5. Kidneys, gastro-intestinal tract, pyelography.
LEON T. LEWALD — St. Luke's Hospital — Morning. Technique. Gibb's Laboratory — Afternoon. Colon.
ISAAC SETH HIRSCH — Bellevue Hospital — Morning. Technique. Afternoon. Demonstration of plates.
SINCLAIR TOUSEY — Private Laboratory — 12 to 1. Measurement of intensity of the X-ray with a view to accurate dosage in radiotherapy and safety in radiography.

Friday, November 15th

ARTHUR F. HOLDING — Cornell University Medical College — 1:30 to 2:30. Fulguration and treatment. Post Graduate Hospital — 3 to 5. Fluoroscopy of the gastro-intestinal tract.
LEWIS GREGORY COLE — Private Laboratory — Afternoon. Stomach, duodenum and œsophagus.
BYRON CLARY DARLING — Private Laboratory — Morning. Bones and joints. Ruptured and Crippled Hospital — 3 to 4. St. Vincent's Hospital — 4 to 5.
ISAAC SETH HIRSCH — Bellevue Hospital — Morning. Technique. Afternoon. Demonstration of plates.
WILLIAM H. STEWART — Harlem Hospital — Morning. Fractures, especially of the skull. German Hospital — 11 to 12. Recent advances in X-ray diagnosis.
GEORGE M. McKEE and JOHN REMER — Private Laboratory — 2 to 4. Demonstration of treatments, together with radiographic work.
FREDERICK M. LAW — Manhattan Eye and Ear Hospital — 1 to 3. Accessory sinuses, mastoid, localization of foreign bodies in the eye.
FRED H. ALBEE — Post Graduate Hospital — 9 to 10. Bone and joint lesions.
CHARLES M. CALDWELL and DR. STEWART — Presbyterian Hospital — Afternoon. Stomach, colon and chest, especially stereoscopically.
ADONIRAM JUDSON QUIMBY — Private Laboratory — 9 to 10. Chest. Throat, Nose and Lung Hospital — 2 to 3. Accessory sinuses.
EDWARD LEAMING — Roosevelt Hospital — 3 to 5. Kidneys, gastro-intestinal tract, pyelography.
LEON T. LEWALD — St. Luke's Hospital — Morning. Technique. Gibb's Laboratory — Afternoon. Colon.

Saturday, November 16th

BYRON CLARY DARLING — Private Laboratory — Morning. Bones and joints.
LEWIS GREGORY COLE — Private Laboratory — Afternoon. Stomach, duodenum and œsophagus.
WILLIAM H. STEWART — German Hospital — 11 to 12. Recent advances in X-ray diagnosis.
ARTHUR F. HOLDING — Cornell University Medical College — 1:30 to 2:30. Fulguration and treatment. Post Graduate Hospital — 3 to 5. Fluoroscopy of the gastro-intestinal tract.
FREDERICK M. LAW — Manhattan Eye and Ear Hospital — 1 to 3. Accessory sinuses, mastoid, localization of foreign bodies in the eye.
CHARLES M. CALDWELL and DR. STEWART — Presbyterian Hospital — Afternoon. Stomach, colon and chest, especially stereoscopically.
ADONIRAM JUDSON QUIMBY — Private Laboratory — 9 to 10. Chest. Foundling Hospital — 1 to 2. Epilation. Throat, Nose and Lung Hospital — 2 to 3. Accessory sinuses.
ISAAC SETH HIRSCH — Bellevue Hospital — Morning. Technique. Afternoon. Demonstration of plates.
EDWARD LEAMING — Roosevelt Hospital — 3 to 5. Kidneys, gastro-intestinal tract, pyelography.
LEON T. LEWALD — St. Luke's Hospital — Morning. Technique. Gibb's Laboratory — Afternoon. Colon.

Days and Hours to be Announced

LUDWIG KAST — Post Graduate Hospital.

LABORATORY DEMONSTRATIONS

Monday, November 11th

ROCKEFELLER INSTITUTE — Exhibits and demonstrations by members of the staff, 9 to 12 A. M.
ROOSEVELT HOSPITAL — Department of Pathology, DRS. WARREN, PECK and EVANS — Demonstration of laboratory findings in case of hæmolytic jaundice with splenectomy, 9 A. M.

Tuesday, November 12th

MT. SINAI HOSPITAL — DR. LEO BUERGER — Pathology of thrombo-angiitis obliterans, 10 A. M.
POST GRADUATE MEDICAL SCHOOL AND HOSPITAL — PROF. JONATHAN WRIGHT and assistants — Exhibition of new laboratories: Pathologic chemistry, bacteriology, pathology, tropical medicine. Remarks on the work of the New York Post Graduate Pellagra Commission. Demonstration of trypanosoma growing in vitro. Demonstration of animal parasites: Protozoa, malaria, hatching of the miracidium of schistosoma hæmatobium. Demonstration of routine examinations in division of pathologic chemistry. Demonstration of sections of some of the rarer tumors. 2 to 5 P. M.
SKIN AND CANCER HOSPITAL — Committee on Scientific Research — A, Specimens; casts and photographs; cancer treatments. B, Animal; experimental. C, Electrical treatments: Fulguration of de Keating Hart, pseudo-fulguration, electro-coa ulation of Doyen, desiccation, thermo-radiotherapy, diathermy of Nagelschmidt. 4 to 6 P. M.
GERMAN HOSPITAL — A. GARBAT — Serology, 3 P. M.

Wednesday, November 13th

ROCKEFELLER INSTITUTE — Exhibitions and demonstrations by members of the staff, 9 to 12 A. M.

MT. SINAI HOSPITAL — DR. F. S. MANDELBAUM — Demonstration of tumors in the genito-urinary tract, 11 A. M.

ST. LUKE'S HOSPITAL — Department of Pathology, DR. F. C. WOOD — Interesting surgical specimens and demonstration of methods of recording surgical material, 2 to 4 P. M.

UNIVERSITY AND BELLEVUE HOSPITAL MEDICAL COLLEGE — Department of Pathology: DR. DOUGLAS SYMMERS, demonstration of specimens in surgical pathology. Department of Physiology: DR. H. C. JACKSON, demonstration of problems pertaining to surgical pathology. Department of Experimental Surgery: DRS. GEORGE D. STEWART and ARTHUR WRIGHT, demonstration of problems pertaining to experimental surgery. 2 to 5 P. M.

GERMAN HOSPITAL — F. HUMPHREYS — Pathology, 3 P. M.

CORNELL UNIVERSITY MEDICAL COLLEGE — DRS. B. J. LEE and F. BEEKMAN — Topics in surgical pathology.

Thursday, November 14th

COLLEGE OF PHYSICIANS AND SURGEONS — DR. GEORGE S. HUNTINGTON, Professor of Anatomy: Lecture and demonstration of specimens of structure and development of genito-urinary tract with special reference to surgical conditions, 10 A. M. DR. W. G. MACCALLUM, Professor of Pathology: Demonstration of specimens and the results of studies in experimental pathology, including cardiac pathology, diseases of organs of internal secretion and cancer studies, 12 M.

CORNELL UNIVERSITY MEDICAL COLLEGE — Department of Anatomy, DRS. STOCKARD and BURROUGHS: Demonstration of bone development and growth; demonstration of clarified anatomical specimens. Department of Experimental Surgery, DRS. J. A. HARTWELL and HOGUET: Demonstration of experiments in high intestinal obstruction. DRS. B. J. LEE and F. BEEKMAN: Demonstration of osteopathology and certain fields in surgical pathology. Department of Experimental Therapeutics, DRS. BEEBE and WEIL: Demonstration of experiments in cancer research. DR. HATCHER: Pharmacodynamics and surgery. DRS. LUSK and MURLIN: The headless cat as a subject of physiological experiment, 2 to 5 P. M.

Friday, November 15th

COLLEGE OF PHYSICIANS AND SURGEONS — Department of Pharmacology and Therapeutics, DR. C. C. LIEB: Emergency stimulation in the operating room, 10 A. M. DR. J. A. BLAKE, Professor of Surgery: Demonstration of student course in surgical technique and demonstration of results of experiments in surgical laboratories, 2 P. M. DR. F. H. PIKE. Professor of Physiology: Demonstration of experimental lesions in the central nervous system, 4 P. M. DR. H. B. WILLIAMS, Department of Physiology: Demonstration of electro-cardiagrams, 5 P. M.

GERMAN HOSPITAL — A. GARBAT — Serology, 3 P. M.

Daily Demonstrations.

F. E. SONDERN PRIVATE LABORATORY — Laboratory open daily from 10 A. M. to 2 P. M. for inspection and demonstration of specimens and laboratory findings.

ROOSEVELT HOSPITAL — Department of Pathology. DR. WARREN announces that the laboratory will be open daily for inspection in connection with the clinics held in the operating room.

BELLEVUE HOSPITAL — Department of Pathology. DR. NORRIS announces that the laboratory will be open for inspection with demonstration of specimens daily from 2 to 5 P. M.

LYING-IN HOSPITAL — Pathological Department. DR. LOSEE announces that the laboratory will be open for inspection with demonstration of specimens in obstetrical pathology daily from 2 to 5 P. M.

LONG ISLAND MEDICAL COLLEGE AND HOSPITAL — Department of Pathology, DR. J. M. VAN COTT. Hoagland Laboratory, Department of Bacteriology, DRS. BENJAMIN WHITNEY, OSWALD T. AVERY, HAROLD W. LYALL. Laboratory open daily from 9 to 12 and 2 to 5. Demonstration and exhibit of specimens in connection with the college clinics. Demonstration of certain phenomena in anaphylaxis. Exhibits, including methods of diagnosis used in the hospital, the isolation, cultivation and diagnosis of pathogenic bacteria, the preparation of vaccines and products or research work.

POLYCLINIC MEDICAL SCHOOL AND HOSPITAL — PROFESSORS F. M. JEFFRIES and W. L. MCFARLAND. Laboratory will be open daily from 2 to 4 P. M. Exhibition of unusual pathological tissues. Demonstration of routine clinical examinations.

PRESBYTERIAN HOSPITAL — Laboratory will be open daily for inspection, from 2 to 4 P. M., in connection with clinics.

OPHTHALMOLOGICAL CLINICS

Monday, November 11th

RUDOLF DENIG and M. HEIMANN — German Hospital — 2 to 4.

DAVID WEBSTER and staff — Manhattan Eye, Ear and Throat Hospital — 2.

PETER A. CALLAN and L. W. CALLAN — New York Eye and Ear Infirmary — 2 to 5.

GEORGE S. DIXON — New York Eye and Ear Infirmary — 3. See Note A.

E. S. THOMSON — Polyclinic Hospital — 3:30.

J. D. RUSHMORE, W. S. SHATTUCK and J. W. INGALLS — Brooklyn Eye and Ear Hospital — 2 to 4.

J. S. WOOD and W. H. SNYDER — Brooklyn Eye and Ear Hospital — 3 to 4.

Tuesday, November 12th

J. B. EMERSON, E. S. THOMPSON and staff — Manhattan Eye, Ear and Throat Hospital — 2.

CARL KOLLER, JULIUS WOLFF and PERCY FRIDENBERG — Mt. Sinai Hospital — 2:30.

HENRY R. PRICE — New York Eye and Ear Infirmary — 3 to 4.

C. H. HELFRICH and A. B. NORTON — New York Ophthalmic Hospital — 2 to 5.

GEORGE S. DIXON — New York Eye and Ear Infirmary — 3.

A. E. DAVIS — New York Post Graduate Hospital — 2 to 4.
EARLE CONNER — Polyclinic Hospital — 2:30.
H. H. WAUGH — Brooklyn Eye and Ear Hospital — 2 to 3.
W. SIMMONS and N. L. NORTH — Brooklyn Eye and Ear Hospital — 2 to 4.
D. W. MEYER — Brooklyn Eye and Ear Hospital — 3 to 4.

Wednesday, November 13th

N. J. HEPBURN, E. L. OATMAN and staff — Manhattan Eye, Ear and Throat Hospital — 2.
WALTER E. LAMBERT — New York Eye and Ear Infirmary — 2 to 4.
GEORGE S. DIXON — New York Eye and Ear Infirmary — 3.
ARNOLD KNAPP — New York Ophthalmic and Aural Institute — 2 to 4.
C. C. BOYLE and E. S. MUNSON — New York Ophthalmic Hospital — 2 to 5.
E. S. THOMSON — Polyclinic Hospital — 3:30.
F. DE F. BAILEY — Brooklyn Eye and Ear Hospital — 2.
J. S. WOOD — Kings County Hospital — 2 to 4.

Thursday, November 14th

R. S. COPELAND — Flower Hospital — 3.
F. E. D'OENCH and O. SCHIRMER — German Hospital — 2 to 4.
FRANK VAN FLEET and staff — Manhattan Eye, Ear and Throat Hospital — 2.
J. E. WEEKS — New York Eye and Ear Infirmary — 2 to 4.
R. G. REESE — New York Eye and Ear Infirmary — 3 to 5.
GEORGE S. DIXON — New York Eye and Ear Infirmary — 3.
F. H. BOYNTON and G. DE W. HALLETT — New York Ophthalmic Hospital — 2 to 5.
EARLE CONNER — Polyclinic Hospital — 3:30.
J. W. INGALLS — Brooklyn Eye and Ear Hospital — 2 to 3.
J. S. WOOD and W. H. SNYDER — Brooklyn Eye and Ear Hospital — 2 to 4.
W. SIMMONS — Brooklyn Eye and Ear Hospital — 3 to 4.

Friday, November 15th

RUDOLF DENIG and M. HEIMANN — German Hospital — 2 to 4.
J. E. GILES and staff — Manhattan Eye, Ear and Throat Hospital — 2.
EMIL GRUENING — New York Eye and Ear Infirmary — 2 to 4.
GEORGE S. DIXON — New York Eye and Ear Infirmary — 3.
ARNOLD KNAPP — New York Ophthalmic and Aural Institute — 2 to 4.
C. DEADY and F. G. RITCHIE — New York Ophthalmic Hospital — 2 to 5.
E. S. THOMSON — Polyclinic Hospital — 3:30.
H. H. WAUGH and F. DE F. BAILEY — Brooklyn Eye and Ear Hospital — 2 to 4.
J. D. RUSHMORE — Brooklyn Eye and Ear Hospital — 2 to 3.
W. SIMMONS — Brooklyn Eye and Ear Hospital — 3 to 4.

Saturday, November 16th

CARL KOLLER, JULIUS WOLFF and PERCY FRIEDENBERG — Mt. Sinai Hospital — 2:30.
WILBUR MARPLE — New York Eye and Ear Infirmary — 2 to 4.
GEORGE S. DIXON — New York Eye and Ear Infirmary — 3.
A. E. DAVIS — New York Post Graduate Hospital — 2 to 4.
EARLE CONNER — Polyclinic Hospital — 3:30.
D. W. MEYER — Brooklyn Eye and Ear Hospital — 2 to 4.
J. S. WOOD — Brooklyn Eye and Ear Hospital — 3.
H. D. SCHENCK — Cumberland Street Hospital — 2 to 3.

NOTE A. Dr. Geo. S. Dixon will demonstrate the method employed for localization of foreign bodies in and about the eye-ball by means of X-ray skiagraphy at 3 P. M. daily.

NOTE B. Saturday, November 16th, at 2 P. M., the Committee of the Manhattan Eye, Ear and Throat Hospital will be prepared to take visitors through the institution and show any special features of the work in which they may be interested. Clinical cases of unusual interest will be shown at 2 P. M. daily. Demonstration of a series of radiographs of the sinuses will be given on any day of the meeting at 3 P. M.

OTOLOGICAL CLINICS

Monday, November 11th

SIDNEY YANKAUER — Mt. Sinai Hospital — 2 to 4.
ARTHUR B. DUEL — Manhattan Eye, Ear and Throat Hospital — 2 to 4.
JAMES F. McKERNON — Manhattan Eye, Ear and Throat Hospital — 3 to 5.
EDWARD B. DENCH — New York Eye and Ear Infirmary — 3 to 5.
ARTHUR B. DUEL — New York Polyclinic Hospital — 5.
W. C. PHILLIPS — New York Post Graduate Hospital — 2:30 to 5.
H. A. ALDERTON — Brooklyn Eye and Ear Hospital — 2.
B. H. SHEA — Cumberland Street Hospital — 4 to 5.

Tuesday, November 12th

W. C. PHILLIPS — Manhattan Eye, Ear and Throat Hospital — 2 to 4.
T. P. BERENS — Manhattan Eye, Ear and Throat Hospital — 3 to 5.
GORHAM BACON — New York Eye and Ear Infirmary — 3 to 5.
GEORGE W. McDOWELL — New York Ophthalmic Hospital — 2.
P. D. KERRISON — New York Polyclinic Hospital — 5.
JAMES F. McKERNON — New York Post Graduate Hospital — 2:30 to 5.
R. J. HELD — New York Throat, Nose and Lung Hospital — 2 to 4.
W. C. BRAISLIN and S. H. LUTZ — Brooklyn Eye and Ear Hospital — 2 to 4.

FELIX COHN — Beth Israel Hospital — 9 to 12.
F. J. QUINLAN — St. Vincent's Hospital — 2:30.

Wednesday, November 13th

R. L. LOUGHRAN — Manhattan Eye, Ear and Throat Hospital — 2 to 4.
FRED WHITING — New York Eye and Ear Infirmary — 3 to 5.
JOHN R. PAGE — New York Polyclinic Hospital — 5.
JOHN B. RAE — New York Post Graduate Hospital — 2:30 to 5.
W. S. SHATTUCK — Brooklyn Eye and Ear Hospital — 2 to 4.
C. N. COX — Brooklyn Eye and Ear Hospital — 2.
J. E. SHEPPARD — Long Island College Hospital — 3 to 4.

Thursday, November 14th

W. C. PHILLIPS — Manhattan Eye, Ear and Throat Hospital — 2 to 4
T. P. BERENS — Manhattan Eye, Ear and Throat Hospital — 3 to 5.
DAVID G. YATES — New York City Hospitals (Randall's Island) — 2 to 4.
WILLIAM L. CULBERT — New York City Hospitals (Randall's Island) — 3 to 5.
JOHN L. ADAMS — New York Eye and Ear Infirmary — 3 to 5.
J. HENRY GUNTZER — New York Polyclinic Hospital — 5.
R. L. LOUGHRAN — New York Post Graduate Hospital — 2:30 to 5.
S. J. KOPETZKY — New York Red Cross Hospital — 2:30.
R. J. HELD — New York Throat, Nose and Lung Hospital — 2 to 4.
JAMES W. CASSELL — J. Hood Wright Hospital — 2 to 4.
B. C. COLLINS — Brooklyn Eye and Ear Hospital — 2 to 4.
W. S. SHATTUCK — Brooklyn Eye and Ear Hospital — 3:30 to 5

Friday, November 15th

ARTHUR B. DUEL — Manhattan Eye, Ear and Throat Hospital — 2 to 4.
JOHN B. RAE — Manhattan Eye, Ear and Throat Hospital — 3 to 5.
JOSEPH A. KENEFICK — New York Eye and Ear Infirmary — 3 to 5.
GEORGE A. SHEPARD — New York Ophthalmic Hospital — 2.
ARTHUR B. DUEL — New York Polyclinic Hospital — 5.
W. C. PHILLIPS — New York Post Graduate Hospital — 2:30 to 5.
W. C. BRAISLIN, C. N. COX, W. S. SHATTUCK and H. A. ALDERTON — Brooklyn Eye and Ear Hospital — 2 to 4.
S. LUTZ — Brooklyn Eye and Ear Hospital — 3:30 to 5.

Saturday, November 16th

W. C. PHILLIPS — Manhattan Eye, Ear and Throat Hospital — 2 to 4.
S. McCULLAGH — Manhattan Eye, Ear and Throat Hospital — 3 to 5.
FRED WHITING — Mt. Sinai Hospital — 2 to 4.
S. OPPENHEIMER — Mt. Sinai Hospital — 3 to 5.
GEORGE E. STEEL — New York City Hospitals (Randall's Island) — 2 to 4.
C. J. COLLES — New York City Hospitals (Randall's Island) — 3 to 5.
ROBERT LEWIS — New York Eye and Ear Infirmary — 3 to 5.
P. D. KERRISON — New York Polyclinic Hospital — 5.
JOHN B. RAE — New York Post Graduate Hospital — 2:30 to 5.
R. J. HELD — New York Throat, Nose and Lung Hospital — 2 to 4.
B. C. COLLINS — Brooklyn Eye and Ear Hospital — 2 to 4.
FELIX COHN — German Hospital — 2 to 5.

LARYNGOLOGICAL CLINICS

Monday, November 11th

LEWIS A. COFFIN — Manhattan Eye, Ear and Throat Hospital — 2.
EMIL MAYER and SIDNEY YANKAUER — Mt. Sinai Dispensary — 2 to 4.
CHARLES E. TEETS — New York Ophthalmic Hospital — 2 to 4.
C. C. RICE — New York Post Graduate Hospital — 2.
B. O. SHEEDY — New York Post Graduate Hospital — 8 P. M.
F. J. QUINLAN — Polyclinic Hospital — 2.
C. E. PAINE — Cumberland Street Hospital — 2 to 3.
H. ARROWSMITH and assistants — Kings County Hospital — 3 to 4.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary. 3. Radical sphenoid operation.

Tuesday, November 12th

D. MACPHERSON, W. W. CARTER and F. W. WHITE — Manhattan Eye, Ear and Throat Hospital — 11.
HARMON SMITH — Manhattan Eye, Ear and Throat Hospital — 2.
J. W. GLEITSMAN and FELIX COHN — German Hospital — 3:30.
HAROLD HAYS — New York Eye and Ear Infirmary — 2.
D. BRYSON DELAVAN — New York Polyclinic Hospital — 2 to 3:30.
BEAMAN DOUGLASS — New York Post Graduate Hospital — 2.
L. M. HURD and H. H. CURTIS — New York Throat, Nose and Lung Hospital — 3.
W. A. CHISHOLM — University and Bellevue Hospital clinic — 2.
C. G. CRANE and F. H. LASHER — Brooklyn Hospital Dispensary — 2.
P. H. STURGES and A. C. HOWE — Jewish Hospital (Brooklyn) — 2 to 3.
J. KEPKE — Long Island College Hospital — 2 to 3.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary.
J. MEYER — St. Catherine's Hospital — 3 to 4.
L. A. McCLELLAND — Williamsburgh Hospital — 1 to 3.

Wednesday, November 13th

C. G. COAKLEY — Miss Alston's Sanatorium — 8 Killian sinus operation
JOHN HORN and H. A. EHRMANN — German Hospital — 2.

C. E. MUNGER, EDGAR H. FARR, G. H. COCKS, J. D. KERNAN and G. M. PHELPS — Manhattan Eye, Ear and Throat Hospital — 11.
W. F. CHAPPEL — Manhattan Eye, Ear and Throat Hospital — 2.
EMIL MAYER and SIDNEY YANKAUER — Mt. Sinai Dispensary — 2 to 4.
I. TOWNSEND—New York Ophthalmic Hospital—2 to 4.
ROBERT G. MYLES — New York Polyclinic Hospital 2:30.
T. J. HARRIS — Post Graduate Hospital — 1.
C. C. RICE — Post Graduate Hospital — 2.
J. A. MacISAAC and R. J. HELD — New York Throat, Nose and Lung Hospital — 3.
F. S. MATHEWS — St. Mary's Free Hospital for Children — 9.
JOHN McCOY — University and Bellevue Hospital Clinic — 2.
W. M. GARDNER and L. T. JACKMAN — Samaritan Hospital — 2 to 4.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary. 3. Radical maxillary antrum operations.

Thursday, November 14th

J. E. MACKENTY and J. H. GUNTZER — Manhattan Eye, Ear and Throat Hospital — 11.
S. OPPENHEIMER and MILTON BALLIN — Mt. Sinai Dispensary — 3.
F. J. QUINLAN — New York Polyclinic Hospital — 2:30.
T. J. HARRIS — Post Graduate Hospital — 1.
B. DOUGLASS — Post Graduate Hospital — 2.
B. O. SHEEDY — Post Graduate Hospital — 8 P. M.
S. GOLDSTEIN and H. H. CURTIS — New York Throat, Nose and Lung Hospital — 3.
H. JARECKY — Sydenham Hospital — 2.
W. A. CHISHOLM — University and Bellevue Hospital Clinic — 2.
C. G. COAKLEY — University and Bellevue Hospital Clinic — 2.
A. WORRALL PALMER — New York Ophthalmic Hospital — 2 to 4.
F. C. RAYNOR and W. H. STEERS — Brooklyn Eye and Ear Hospital — 2 to 4.
J. H. DROGE — German Hospital (Brooklyn) — 2 to 4.
R. L. MOORHEAD — German Hospital (Brooklyn) — 3 to 4.
T. R. FRENCH, W. F. DUDLEY and P. H. STURGES — Long Island College Hospital — 3:30.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary.

Friday, November 15th

T. J. HARRIS, S. McCULLAGH, W. N. HUBBARD, E. V. HUBBARD and S. W. ROOF — Manhattan Eye, Ear, and Throat Hospital — 11.
W. FREUDENTHAL — Beth Israel Hospital — 1 to 5.
JOSEPH H. ABRAHAM — New York Polyclinic Hospital — 2 to 3:30.
C. C. RICE — Post Graduate Hospital — 2.
JOHN McCOY — University and Bellevue Hospital Clinic — 2.
H. ARROWSMITH and F. L. TUCKER — Brooklyn Eye and Ear Hospital — 1:30 to 3:30.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary. 3. Bronchoscopies.

Saturday, November 16th

J. GLEITSMANN and F. COHN — German Hospital — 2.
R. C. MYLES — Polyclinic Hospital — 2.
S. H. VEHSLAGE — New York Ophthalmic Hospital — 2 to 4.
T. J. HARRIS — New York Post Graduate Hospital — 1.
F. S. LOVELL — New York Post Graduate Hospital — 2.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary.

CLINICS IN BROOKLYN HOSPITALS

Monday, November 11th

W. C. WOOD — Brooklyn Hospital — 10 to 12. Surgical operations.
N. P. RATHBUN — Brooklyn Hospital — 1 to 3. Genito-urinary clinic. New Dispensary.
J. E. JENNINGS — Brooklyn Hospital — 2 to 4. Surgical operations.
H. A. ALDERTON — Brooklyn Eye and Ear Hospital — 2. Ear operations.
J. D. RUSHMORE, W. S. SHATTUCK and J. W. INGALLS — Brooklyn Eye and Ear Hospital — 2 to 4. Eye clinics.
J. S. WOOD and W. H. SNYDER — Brooklyn Eye and Ear Hospital — 3 to 4. Eye operations.
W. H. RANKIN — Coney Island Hospital — 11 to 1. Gynecological operations.
A. H. BOGART — Coney Island Hospital — 2 to 4. Surgical operations.
W. R. ISZARD — Cumberland Street Hospital — 9 to 11. Genito-urinary clinic.
C. E. PAINE — Cumberland Street Hospital — 2 to 3. Nose and throat clinic.
B. H. SHEA — Cumberland Street Hospital — 4 to 5. Ear operations.
R. S. FOWLER — German Hospital — 10 to 1. Surgical operations.
B. HARRIS—German Hospital—10. Genito-urinary clinic.
W. LINDER — Jewish Hospital — 9 to 12. Surgical operations.
W. L. DUFFIELD — Jewish Hospital — 2 to 4. Surgical operations.
V. H. PENTLARGE — Jewish Hospital — 2 to 4. Genito-urinary clinic.
S. J. McNAMARA — Kings County Hospital — 10 to 12. Gynecological operations.
H. ARROWSMITH and assistants — Kings County Hospital — 3 to 4. Nose and throat operations.
J. C. RUSHMORE — Long Island College Hospital — 9 to 12. Surgical operations.
H. H. MORTON — Long Island College Hospital — 2 to 4. Genito-urinary operations.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary. 3. Radical sphenoid operation.
A. H. BOGART, and J. B. BOGART — Methodist Episcopal Hospital — 9 to 11. Surgical operations.
W. A. SHERWOOD — Methodist Episcopal Hospital — 11 to 1. Surgical operations.
B. D. HARRINGTON — Midwood Hospital — 9 to 12. Surgical operations.
H. B. DELATOUR — Norwegian Hospital — 9 to 11. Gynecological and surgical operations.

L. S. PILCHER and P. M. PILCHER — Pilcher Private Hospital — 9 to 12. Surgical operations.
O. S. RITCH — Prospect Heights Hospital — 3 to 5. Surgical operations.
J. D. SULLIVAN — St. Mary's Hospital — 10 to 1. Surgical operations.
W. L. CHAPMAN — Swedish Hospital — 10 to 12. Surgical operations.

Tuesday, November 12th

R. H. POMEROY — Brooklyn Hospital — 9 to 12. Gynecological operations.
W. H. CARY — Brooklyn Hospital — 2 to 4. Gynecological clinic. Model Dispensary, just completed.
A. A. HUSSEY — Brooklyn Hospital — 2 to 4. Obstetrical operations.
C. G. CRANE and F. H. LASHER — Brooklyn Hospital Dispensary — 2. Nose and throat clinic.
W. C. BRAISLIN and S. H. LUTZ — Brooklyn Eye and Ear Hospital — 2 to 4. Ear clinics.
H. H. WAUGH — Brooklyn Eye and Ear Hospital — 2 to 3. Eye operations.
W. SIMMONS and N. L. NORTH — Brooklyn Eye and Ear Hospital — 2 to 4. Eye clinics.
D. W. MEYER — Brooklyn Eye and Ear Hospital — 3 to 4. Eye operations.
E. H. FISKE — Coney Island Hospital — 2 to 4. Surgical operations.
H. M. MILLS — Coney Island Hospital — 11 to 1. Gynecological operations.
R. F. WALMSLEY — Cumberland Street Hospital — 1 to 3. Surgical operations.
S. W. PALLISTER — Cumberland Street Hospital — 3 to 5. Surgical operations.
J. P. WARBASSE — German Hospital — 10 to 1. Surgical operations.
J. M. DOWNEY — Holy Family Hospital — 2 to 4. Surgical operations.
J. O. POLAK — Jewish Hospital — 9 to 12; 2 to 6. Gynecological operations.
O. P. HUMPSTONE — Jewish Hospital — 2 to 4. Obstetrical operations.
P. H. STURGES and A. C. HOWE — Jewish Hospital — 2 to 3. Nose and throat operations.
A. T. BRISTOW — Kings County Hospital — 10 to 12. Surgical operations.
G. McNAUGHTON — Long Island College Hospital — 9 to 12. Gynecological operations.
J. KEPKE — Long Island College Hospital — 2 to 3. Nose and throat clinic.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary.
T. B. SPENCE — Methodist Epsicopal Hospital — 9 to 11. Surgical operations.
W. F. CAMPBELL — Methodist Episcopal Hospital — 11 to 1. Surgical operations.
R. S. FOWLER — Methodist Episcopal Hospital — 2 to 4. Surgical operations.
E. D. FERRIS — Norwegian Hospital — 10 to 12. Gynecological and surgical operations.
J. F. RANKEN — Prospect Heights Hospital — 10 to 12. Gynecological clinic.
E. J. McENTEE — St. Catherine's Hospital — 9 to 12. Surgical operations.
J. MEYER — St. Catherine's Hospital — 3 to 4. Nose and throat operations.
W. S. SIMMONS — St. John's Hospital — 10 to 12. Surgical operations.
J. C. KENNEDY — St. Mary's Hospital — 9 to 12. Surgical operations.
J. M. CLAYLAND — St. Mary's Hospital — 2 to 4. Orthopedic operations.
L. G. BALDWIN — St. Peter's Hospital — 9 to 12. Gynecological operations.
J. F. TODD — St. Peter's Hospital — 11 to 1. Gynecological operations.
C. DUNCAN — Swedish Hospital — 10 to 12. Gynecological operations.
R. J. MORRISON — Williamsburgh Hospital — 9 to 12. Surgical operations.
H. A. WADE — Williamsburgh Hospital — 1 to 3. Gynecological operations.
L. A. McCLELLAND — Williamsburgh Hospital — 3 to 6. Nose and throat operations.
M. L. BODKIN — Williamsburgh Hospital — 2 to 4. Rectal operations.

Wednesday, November 13th

R. W. WESTBROOK — Brooklyn Hospital — 10 to 12. Surgical operations.
N. P. RATHBUN — Brooklyn Hospital Dispensary — 1 to 3. Genito-urinary clinic.
W. S. SHATTUCK — Brooklyn Eye and Ear Hospital — 2 to 4. Ear clinic.
F. DE F. BAILEY — Brooklyn Eye and Ear Hospital — 2. Eye operations.
C. N. COX — Brooklyn Eye and Ear Hospital — 2. Ear operations.
E. MAYNE and J. C. MacEVITT — Coney Island Hospital — 11 to 1. Gynecological operations.
J. P. MURPHY — Coney Island Hospital — 2 to 4. Surgical operations.
C. BURNHAM — Cumberland Street Hospital — 1 to 3. Gynecological operations.
F. WEISBROD — German Hospital — 10 to 1. Gynecological operations.
E. H. FISKE — Holy Family Hospital — 2 to 4. Surgical operations.
W. LINDER — Jewish Hospital — 9 to 12. Surgical operations.
W. L. DUFFIELD — Jewish Hospital — 2 to 4. Surgical operations.
V. H. PENTLARGE — Jewish Hospital — 2 to 4. Genito-urinary clinic.
M. G. WASCH — Jewish Hospital — 2 to 4. X-ray clinic.
H. H. MORTON — Kings County Hospital — 10 to 12. Genito-urinary operations.
J. S. WOOD — Kings County Hospital — 2 to 4. Eye operations.
W. B. BRINSMADE — Long Island College Hospital — 10 to 12. Surgical operations.
J. E. SHEPPARD — Long Island College Hospital — 3 to 4. Ear operations.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary. 3. Radical maxillary antrum operations.
A. H. BOGART and J. B. BOGART — Methodist Episcopal Hospital — 9 to 11. Surgical operations.
C. H. GOODRICH and W. A. SHERWOOD — Methodist Episcopal Hospital — 11 to 1. Surgical operations.
R. DURHAM — Methodist Episcopal Hospital — 11. Genito-urinary clinic.

N. P. RATHBUN — Midwood Hospital — 9 to 12. Surgical operations.
L. S. PILCHER and P. M. PILCHER — Pilcher Private Hospital — 9 to 12. Surgical operation
S. W. PALLISTER — Prospect Heights Hospital — 3 to 5. Surgical operations.
H. B. DELATOUR — St. John's Hospital — 9 to 12. Gynecological and surgical operations.
J. R. KEVIN — St. Mary's Hospital — 9 to 12. Surgical operations.
J. C. MACEVITT — St. Mary's Hospital — 2 to 4. Gynecological operations.
W. M. GARDNER and L. T. JACKMAN — Samaritan Hospital — 2 to 4. Nose and throat operations.
L. A. LYNCH — Swedish Hospital — 10 to 12. Surgical operations.

Thursday, November 14th

R. L. DICKINSON — Brooklyn Hospital — 9 to 12. Gynecological operations.
J. E. JENNINGS — Brooklyn Hospital — 2 to 4. Surgical operations.
A. A. HUSSEY — Brooklyn Hospital — 2 to 4. Obstetrical operations.
F. A. HULST — Brooklyn Hospital — 2 to 4. Pathological laboratory exhibit.
F. C. RAYNOR and W. H. STEERS — Brooklyn Eye and Ear Hospital — 2 to 4. Nose and throat operations.
B. C. COLLINS — Brooklyn Eye and Ear Hospital — 2 to 4. Ear clinic.
W. S. SHATTUCK — Brooklyn Eye and Ear Hospital — 3:30 to 5. Ear operations.
J. S. WOOD and W. H. SNYDER — Brooklyn Eye and Ear Hospital — 2 to 4. Eye clinics.
J. W. INGALLS — Brooklyn Eye and Ear Hospital — 2 to 3. Eye operations.
W. SIMMONS — Brooklyn Eye and Ear Hospital — 3 to 4. Eye operations.
C. E. LACK — Coney Island Hospital — 2 to 4. Surgical operations.
O. S. RITCH — Cumberland Street Hospital — 1 to 3. Surgical operations.
G. H. ILER — Cumberland Street Hospital — 3 to 5. Surgical operations.
J. P. WARBASSE — German Hospital — 10 to 1. Surgical operations.
J. H. DROGE — German Hospital — 2 to 4. Nose and throat operations.
R. L. MOORHEAD — German Hospital — 3 to 4. Nose and throat operations.
W. LINTZ — Hoagland Laboratory — 2 to 4. Pathological laboratory exhibit.
E. J. MORRIS and V. L. ZIMMERMAN — Holy Family Hospital — 10 to 12. Gynecological operations.
R. SULLIVAN — Holy Family Hospital — 2 to 4. Surgical operations.
G. McNAUGHTON — Jewish Hospital — 9 to 12. Gynecological and obstetrical operations.
R. M. BEACH — Jewish Hospital — 2 to 4. Obstetrical operations.
J. B. BOGART — Kings County Hospital — 10 to 12. Surgical operations.
A. MURRAY — Kings County Hospital — 2 to 4. Pathological laboratory exhibit. Demonstration of projectoscope.
J. O. POLAK, F. C. HOLDEN and N. P. GEIS — Long Island College Hospital — 8 to 12. Gynecological and obstetrical operations.
H. H. MORTON — Long Island College Hospital — 10 to 12. Genito-urinary operations.
T. R. FRENCH, W. F. DUDLEY and P. H. STURGES — Long Island College Hospital — 3:30. Nose and throat operations (ether in upright position).
J. M. VANCOTT — Long Island College and Hoagland Laboratory — 2 to 4. Pathological laboratory exhibit.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary.
T. B. SPENCE — Methodist Episcopal Hospital — 9 to 11. Surgical operations.
C. H. GOODRICH and W. F. CAMPBELL — Methodist Episcopal Hospital — 11 to 1. Surgical operations.
WALTER TRUSLOW — Methodist Episcopal Hospital — 2 to 3. Orthopedic clinic.
H. B. DELATOUR — Norwegian Hospital — 9 to 11. Gynecological and surgical operations.
E. D. FERRIS — Norwegian Hospital — 10 to 12. Gynecological and surgical operations.
J. F. RANKEN — Prospect Heights Hospital — 10 to 12. Gynecological clinic.
N. ROBINSON — Prospect Heights Hospital — 3 to 5. Surgical operations.
P. HUGHES — St. Catherine's Hospital — 9 to 12. Surgical operations.
P. M. PILCHER — St. John's Hospital — 10 to 12. Genito-urinary clinic.
A. T. BRISTOW — St. John's Hospital — 10 to 1. Gynecological and surgical operations.
E. A. PARKER — St. Mary's Hospital — 9 to 12. Surgical operations.
L. G. BALDWIN — St. Peter's Hospital — 9 to 12. Gynecological operations.
J. F. TODD — St. Peter's Hospital — 11 to 1. Gynecological operations.
A. M. JUDD — Swedish Hospital — 10 to 12. Gynecological and obstetrical operations.
E. A. PARKER — Williamsburgh Hospital — 2 to 4. Surgical operations.
J. B. DOWD — Williamsburgh Hospital — 2 to 4. Gynecological operations.

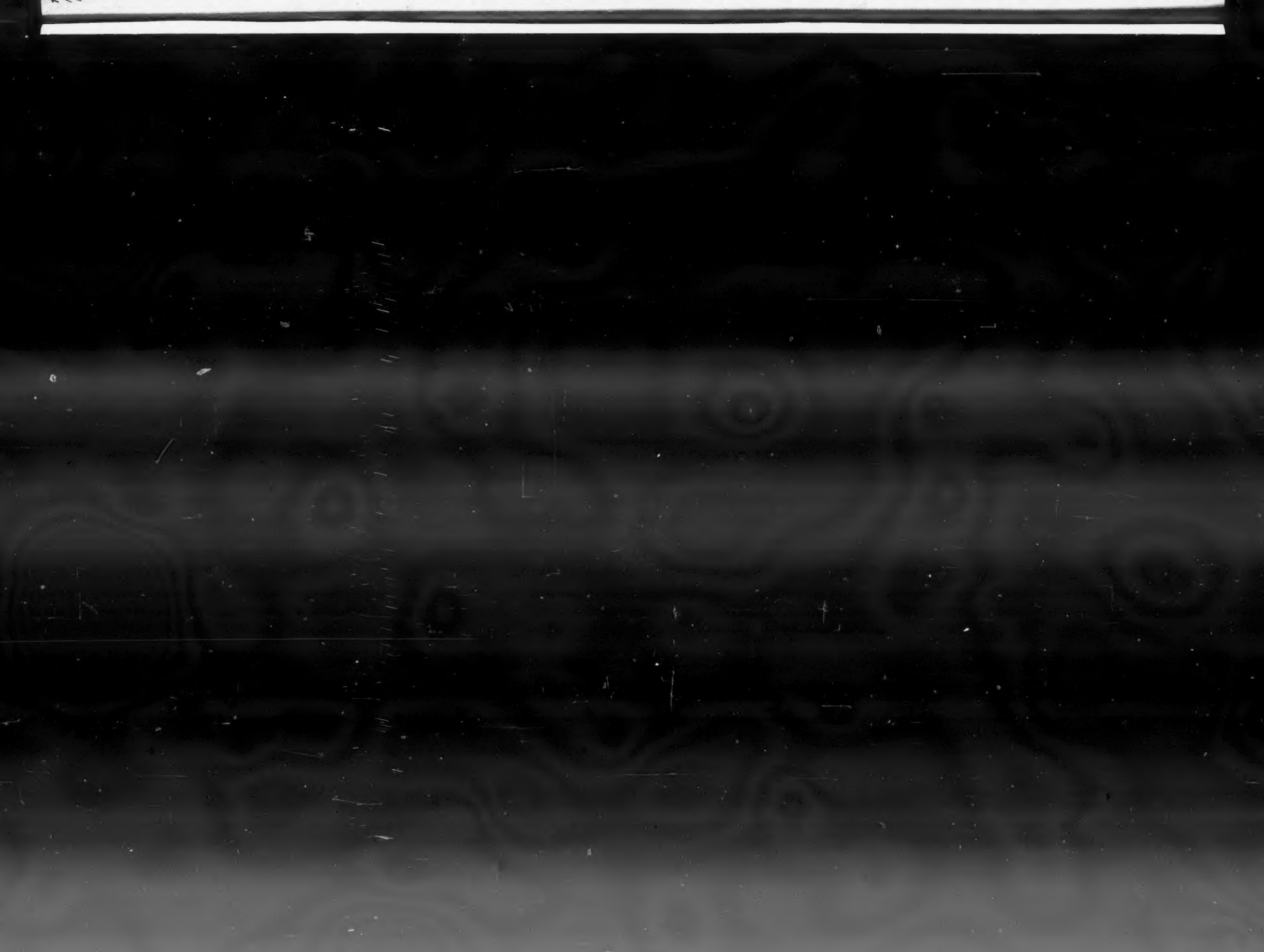
Friday, November 15th

W. C. WOOD — Brooklyn Hospital — 10 to 12. Surgical operations.
N. P. RATHBUN — Brooklyn Hospital — 1 to 3. Genito-urinary clinic. New Dispensary.
R. L. DICKINSON — Brooklyn Hospital — 2 to 5. Gynecological operations.
H. ARROWSMITH and F. L. TUCKER — Brooklyn Eye and Ear Hospital — 1:30 to 3:30. Nose and throat operations.
H. H. WAUGH and F. DE F. BAILEY — Brooklyn Eye and Ear Hospital — 2 to 4. Eye clinics.
J. D. RUSHMORE — Brooklyn Eye and Ear Hospital — 2. to 3 Eye operations.
W. SIMMONS — Brooklyn Eye and Ear Hospital — 3 to 4. Eye operations.
W. C. BRAISLIN, C. N. COX, W. S. SHATTUCK and H. A. ALDERTON — Brooklyn Eye and Ear Hospital — 2 to 4. Ear clinics.

S. LUTZ — Brooklyn Eye and Ear Hospital — 3:30 to 5. Ear operations.
W. H. PIERSON — Cumberland Street Hospital — 1 to 3. Gynecological operations.
J. F. RANKEN — Cumberland Street Hospital — 3 to 5. Gynecological operations.
H. C. ALLEN and T. A. BUYS — Cumberland Street Hospital — 3 to 5. Obstetrical operations.
R. S. FOWLER — German Hospital — 10 to 1. Surgical operations.
M. G. WASCH — Jewish Hospital — 1 to 2:30. X-Ray clinic.
W. LINDER — Jewish Hospital — 2 to 4. Surgical operations.
V. H. PENTLARGE — Jewish Hospital — 2 to 4. Genito-urinary clinic.
J. M. WINFIELD — Kings County Hospital — 10 to 12. Syphilis and cancer clinic.
C. EASTMOND — Kings County Hospital — 11 to 12. X-Ray clinic.
CHARLES D. NAPIER and WALTER TRUSLOW — Kings County Hospital — 3 to 5. Orthopedic operations.
A. T. BRISTOW — Long Island College Hospital — 10 to 12. Surgical operations.
J. S. READ, P. M. PILCHER, W. R. ISZARD, B. HARRIS and R. DURHAM — Long Island College Hospital — 2 to 4. Genito-urinary clinics.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary. 3. Bronchoscopies.
A. H. BOGART and J. B. BOGART — Methodist Episcopal Hospital — 9 to 11. Surgical operations.
W. A. SHERWOOD — Methodist Episcopal Hospital — 11 to 1. Surgical operations.
C. DUNCAN — Midwood Hospital — 9 to 12 Surgical operations.
L. S. PILCHER and P. M. PILCHER — Pilcher Private Hospital — 9 to 12. Surgical operations.
J. F. RANKEN — Prospect Heights Hospital — 10 to 12. Gynecological clinic.
M. FIGUEIRA — St. Catherine's Hospital — 9 to 12. Surgical operations.
J. G. WILLIAMS — St. Catherine's Hospital — 11 to 12. X-Ray clinic.
W. B. BRINSMADE — St. John's Hospital — 9 to 12. Gynecological and surgical operations.
O. A. GORDON — St. Mary's Hospital — 9 to 12. Surgical operations.
J. P. GLYNN — St. Mary's Hospital — 2 to 4. Gynecological operations.
W. S. SIMMONS — Swedish Hospital — 10 to 12. Surgical operations.
J. G. DICKERT — Williamsburgh Hospital — 10 to 12. Surgical clinic.
C. A. GORDON — Williamsburgh Hospital — 2 to 4. Gynecological operations.

Saturday, November 16th

R. W. WESTBROOK — Brooklyn Hospital — 10 to 12. Surgical operations.
B. C. COLLINS — Brooklyn Eye and Ear Hospital — 2 to 4. Ear operations.
D. W. MEYER — Brooklyn Eye and Ear Hospital — 2 to 4. Eye clinic.
J. S. WOOD — Brooklyn Eye and Ear Hospital — 3. Eye operations.
H. D. SCHENCK — Cumberland Street Hospital —2 to 3. Eye operations.
F. WEISBROD — German Hospital — 10 to 1. Gynecological operations.
A. M. JUDD — Jewish Hospital — 9 to 12. Gynecological operations.
O. P. HUMPSTONE — Jewish Hospital — 2 to 4. Obstetrical operations.
C. BARBER — Kings County Hospital — 9 to 11. Surgical operations.
H. E. FRASER — Kings County Hospital — 2 to 4. Genito-urinary operations.
E. PALMER, C. R. HYDE and W. P. POOL — Long Island College Hospital — 9 to 12. Gynecological operations.
JOHN KEPKE — Lutheran Hospital — 8 to 10. Exhibition of new dispensary.
T. B. SPENCE — Methodist Episcopal Hospital — 9 to 11. Surgical operations.
W. F. CAMPBELL — Methodist Episcopal Hospital — 11 to 1. Surgical operations.
R. S. FOWLER — Methodist Episcopal Hospital — 2 to 4. Surgical operations.
J. A. LEE — St. Mary's Hospital — 9 to 12. Surgical operations.
W. F. CAMPBELL — Trinity Hospital — 2 to 5. Surgical operations.



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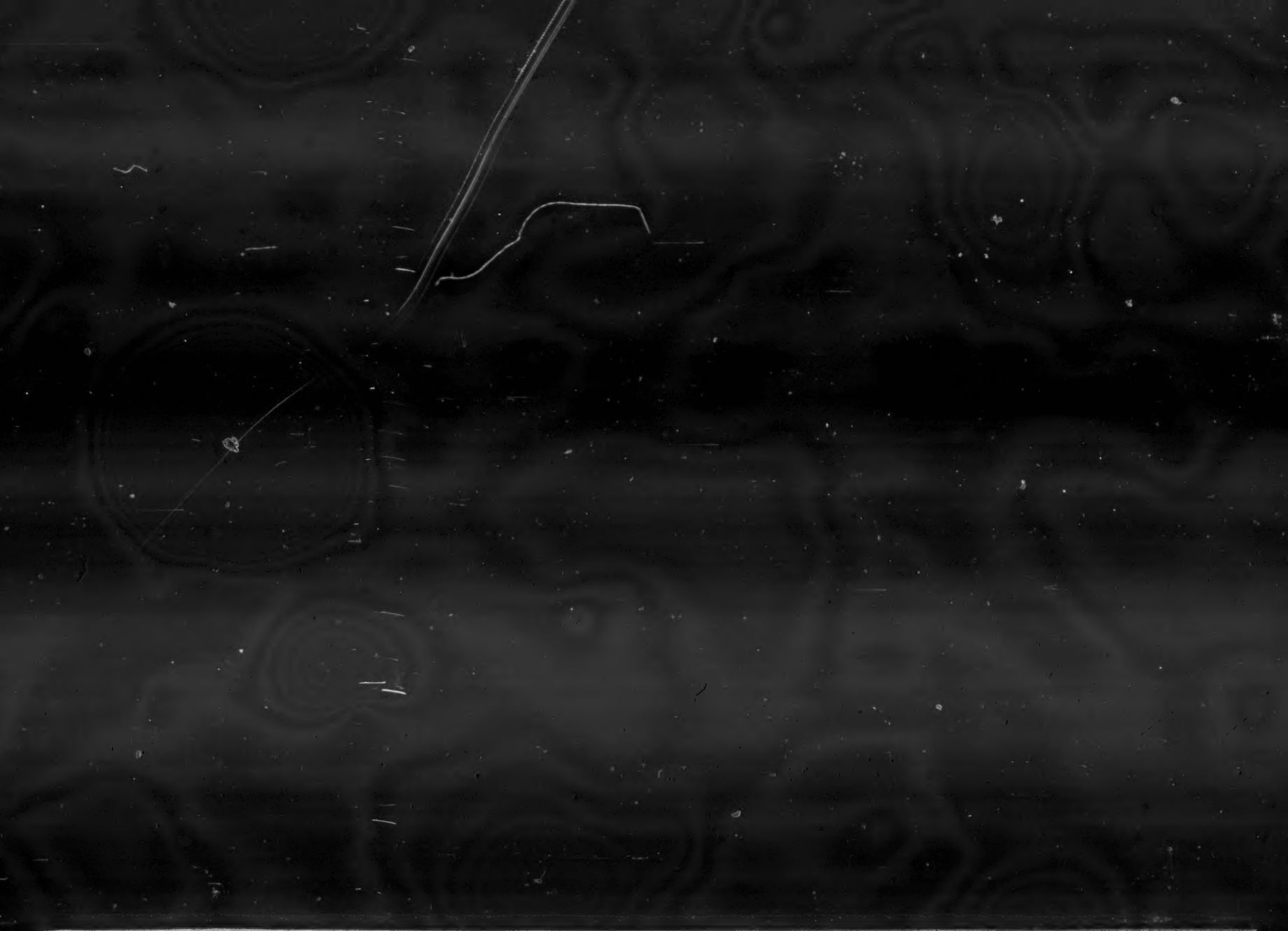

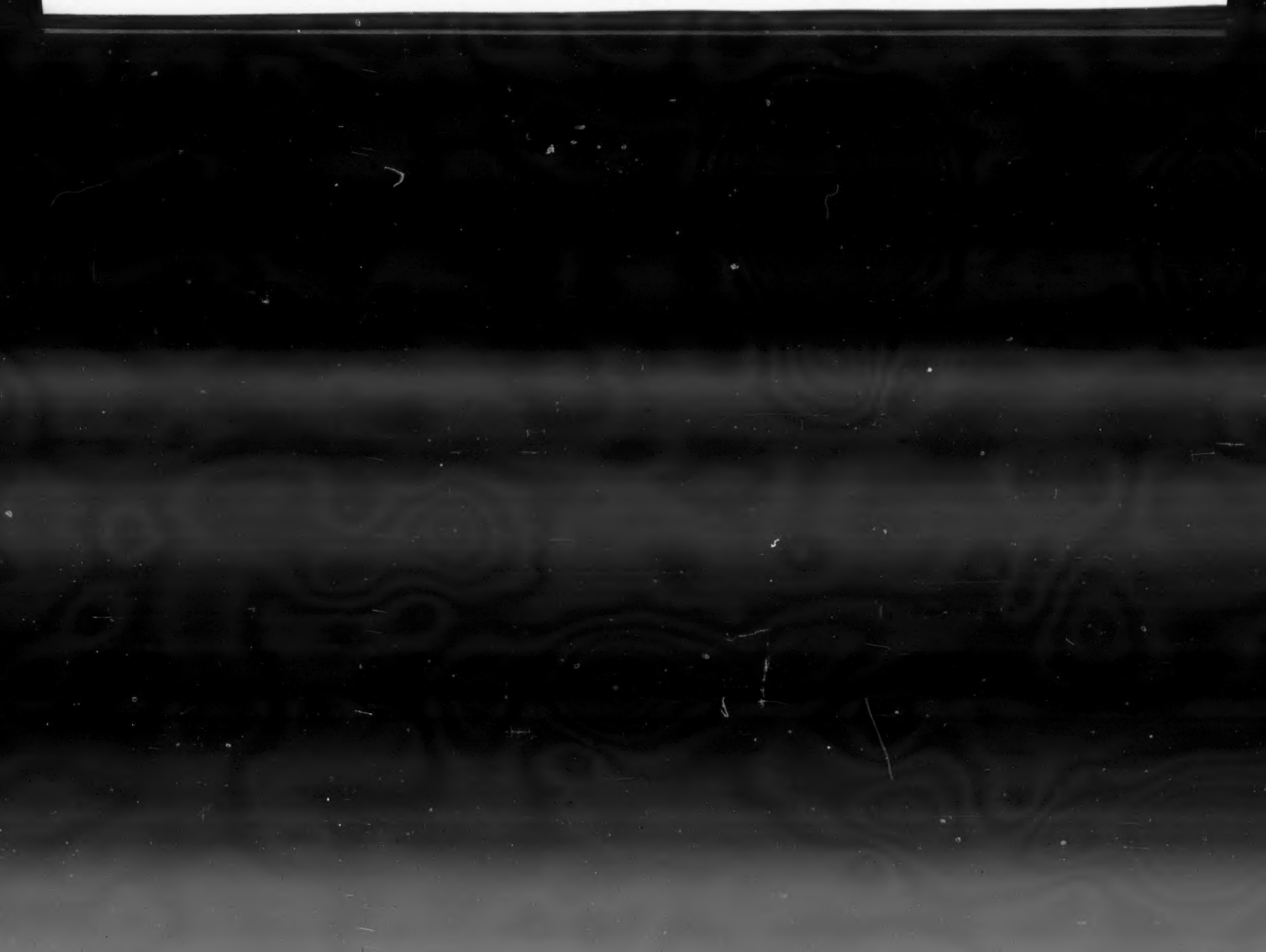

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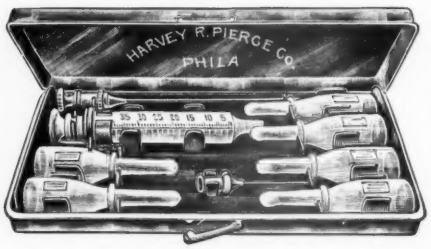

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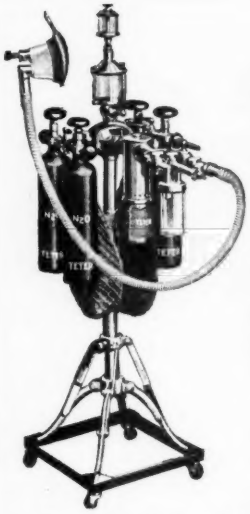

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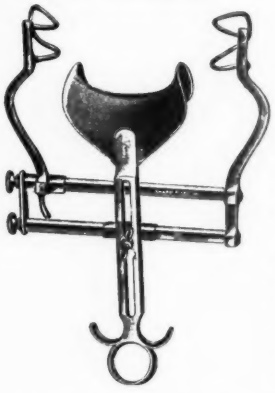

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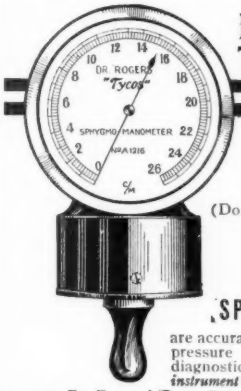

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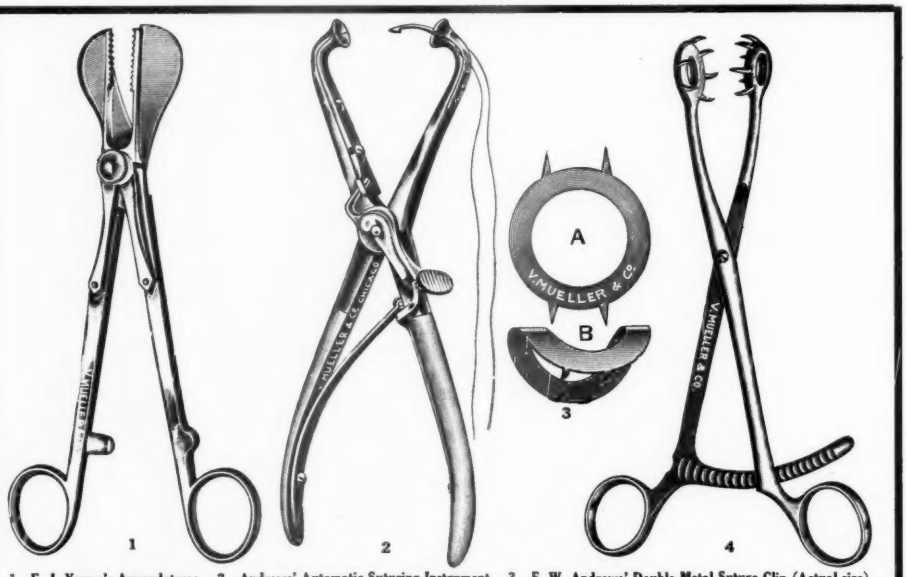

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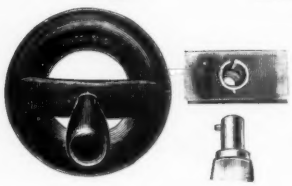

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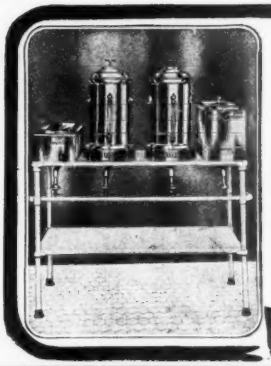

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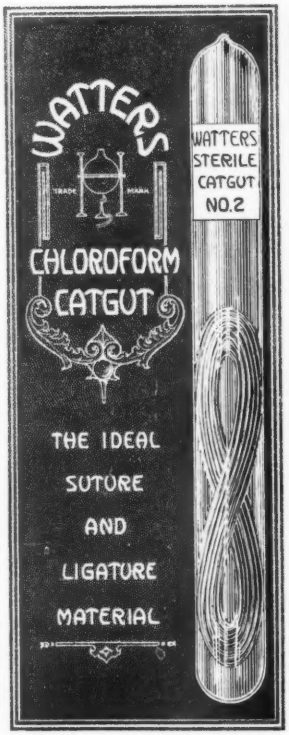

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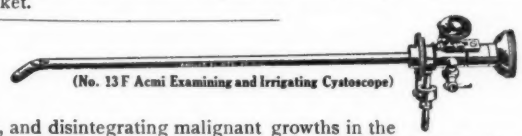
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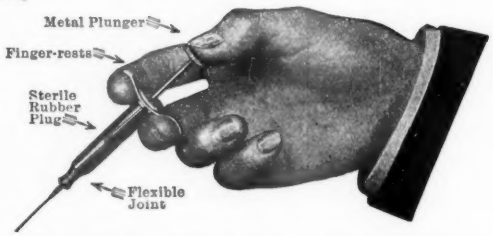

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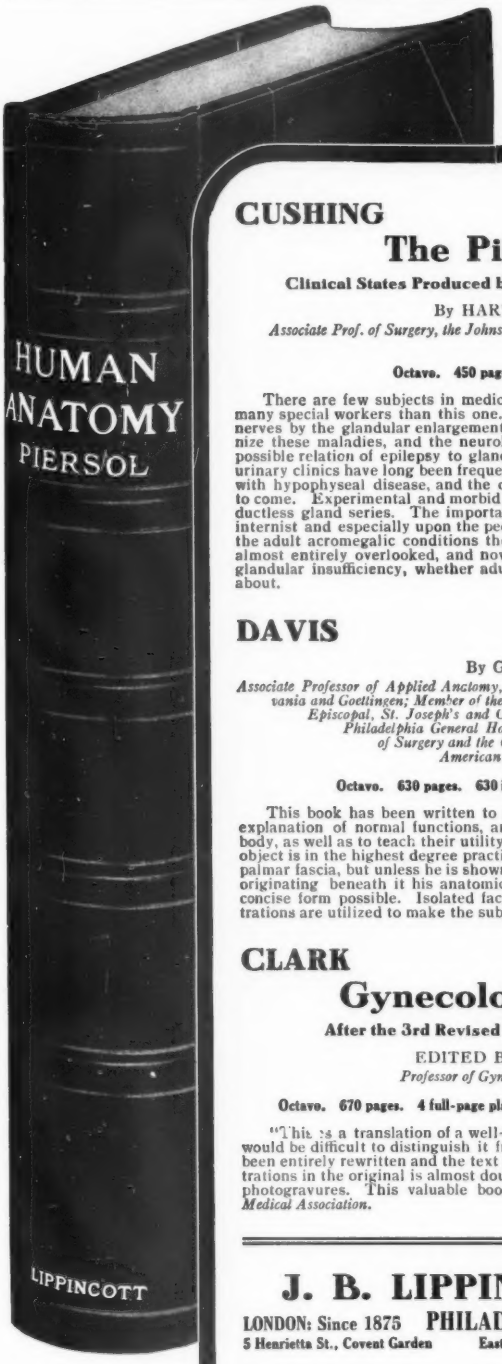

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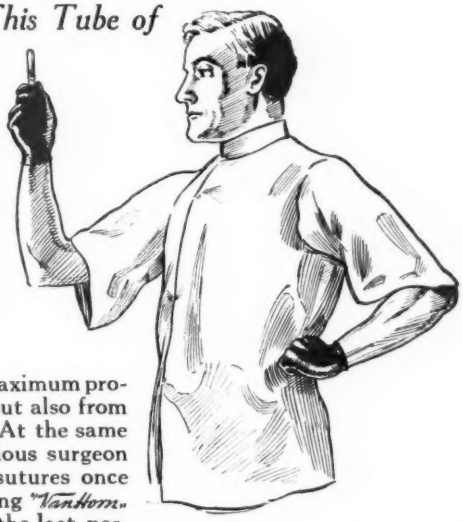

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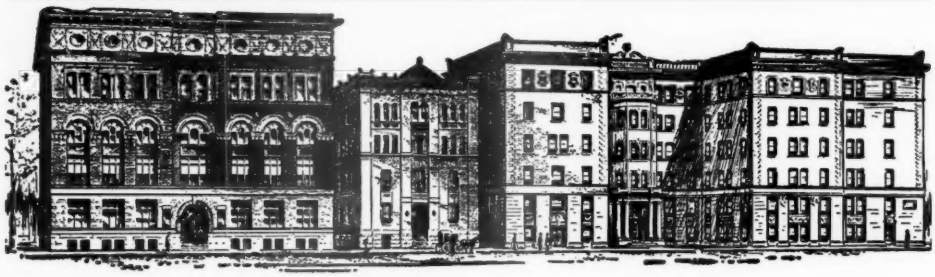

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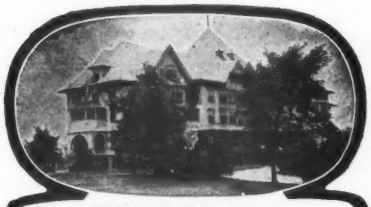

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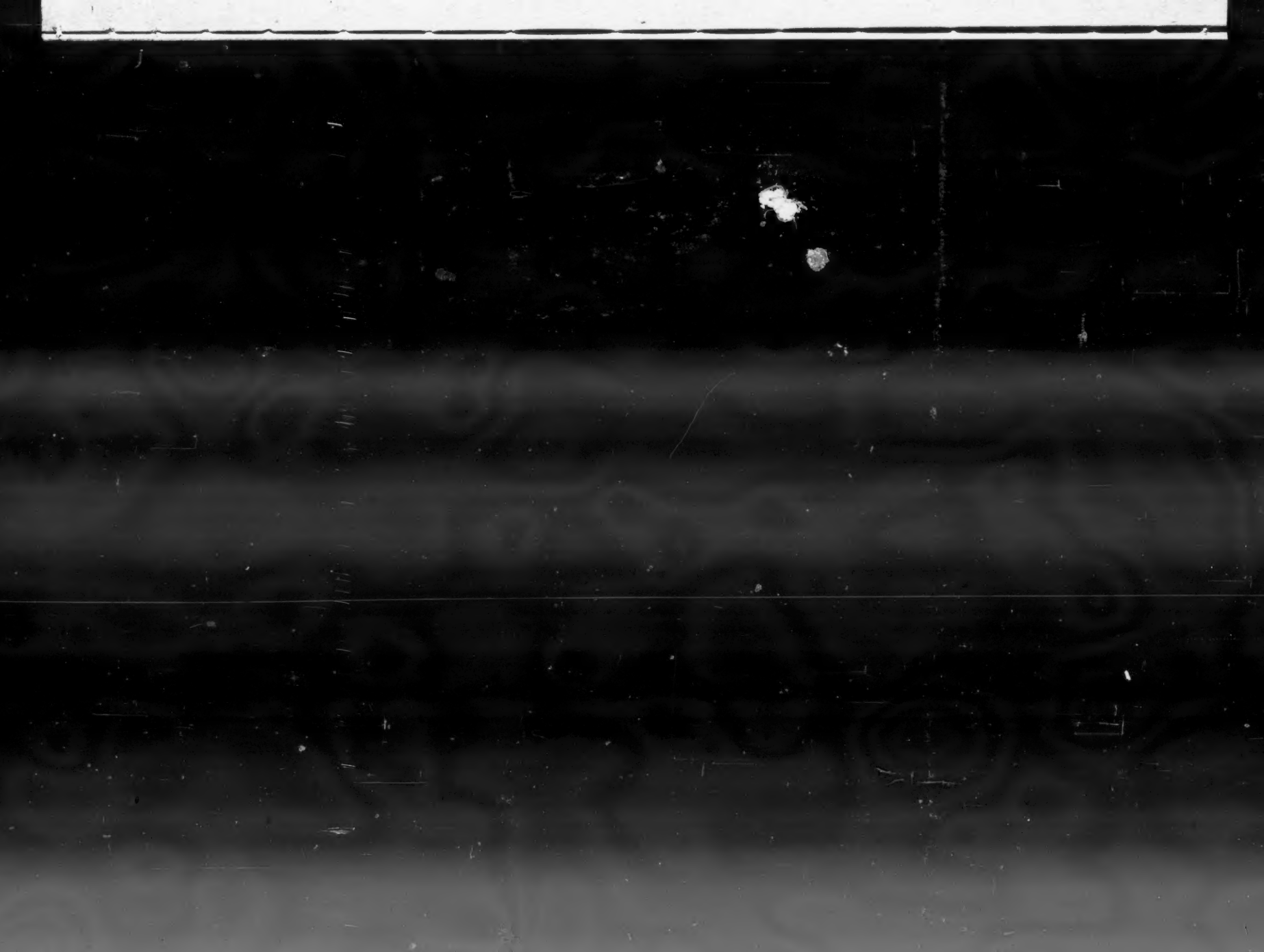

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